the OIL AND GAS JOURNAL
AUGUST 26, 1957

Oil Has Top Billing in '58 Congress

Imports, depletion allowance, natural-gas regulation, mergers—all are on calendar p. 67

World's Largest Underground L.P.G. Reservoir

Barber's Hill, with its 6-million-barrel capacity, plays big role in Houston area petrochemical picture p. 72

Drilling Records Are Put to Work

Unit cost system of accounting is thoroughly explained

p. 93

How to Lower Pipeline Pumping Costs

Variable-speed drives often reduce power costs 10 per cent

p. 100

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JOURNAL News Letter

Aug. 26, 1957
Tulsa, Okla.

A glance at the oil industry's position midway of third quarter:

... Earnings are slipping from first quarter by 10 to 12 per cent.

They're still above this time last year and are expected to stabilize at current levels.

The profit trend generally is: Up for the international oil companies, about steady for domestic royalty firms, and down for domestic producers and refiners.

... Inventories are only in fair shape.

Volumes are high and proving hard to handle. But when based on days' supply on hand, they may be on low side compared with other years.

Crude stocks represent 32 days' supply. Products equal 60 days.

... Prices on refined products east of California have been soft. They are holding firm in California.

... Demand picked up some in July with an 8.7-million barrel daily average. That's about 6 per cent ahead of the month last year.

... Drilling shows a little more spirit.

Rotary rig activity is running slightly ahead of last year at this time. Completions lag some. But offshore work is at a new high.

Offshore, starts are averaging about 50 per month with 65 completions, only 30 per cent of them dry.

... Producers are feeling a squeeze.

New pipeline proration has set in for Texas producers, already cut back to 13 producing days since July. Some Texans without connections complain they can't find any market at all for their crude.

Oil-company officials with contacts in Syria give this report:

No immediate threat to Middle East pipelines from present political turmoil.

These officials don't discount a long-term threat from a Communist-dominated regime. The military coup has brought about another period of watching Syria and waiting.

At stake are two major pipeline systems moving Middle East production from Iraq and Saudi Arabia to eastern Mediterranean shipping ports.

Iraq Petroleum Co.'s system is now moving about 220,000 bbl. daily of Iraq crude across Syria. Trans Arabian Pipeline's throughput is about 335,000 bbl. daily. This represents a sizable portion of Western Europe's

Middle East oil supply.

The I. P. C. system had a capacity of more than 500,000 bbl. daily before its pump stations were sabotaged by the Syrians during the Suez hostilities. Observers point out that Syria has undergone a number of radical changes in government in its short life as a nation. But it always has honored its pipeline commitments except for the period late last year. Then it regarded itself in a state of war.

Congress already is loaded with vital oil bills for 1958.

Here's the lineup:

Harris natural-gas bill will be up for final action. But it may not provide the big fireworks.

Headlines may go to efforts to cut depletion allowance and impose quotas on oil imports.

Other measures to watch: Controls on corporate mergers, offshore oil reserves for the Navy, competitive bidding on federal leases, a divorce for refining and marketing, federal research into oil shale and butadiene and motor fuel from grain.

Topping this, oil men will have a stake in action on taxes and labor. They also will feel the lash of more investigations.

Explorers in Bisti field are worried. Signs are increasing that all producers there may not be profitable.

The Gallup sand producing zone is the reason.

It's proving hard and tight. Wells must be fractured. Recovery is by solution-gas drive. This leads operators to expect a fast decline and skyrocketing gas-oil ratios when normal production gets started.

The worries may be premature. Answer to the profit questions may hinge on these factors: A new pipeline opening a good market in California for Bisti crude, secondary-recovery efforts already starting, well spacing, and good allowables.

Wells completed on the ocean floor are being proposed in California.

Shell and Conoco think some areas of Hermosa Beach's submerged lands may not be reached by slant-drilling from an island a mile offshore. They have asked the Hermosa Beach council to approve use of floating drill barges. Then well-head equipment would be installed on the ocean floor.

The oil firms have offered $8.6 million for the Hermosa Beach offshore leases. The offer still must be approved by a special election.

Statistical returns are in for July wildcatting.

The Washington wildcat of Sunshine Mining in Grays County grabbed the headlines. It is now being rated as a 215-bbl. daily producer and puts the state into the oil-producing column for the first time.

But the bulk of the nation's wildcatting action centered in the Rockies.

Exploration hit a fast pace there, especially in fringes of Denver basin, northwestern Colorado, Williston and Paradox basins.

New wildcat depth records also were set in Texas, Oklahoma, and North Dakota (p. 162).

A 100-mile exploration trend is developing in Northwest Oklahoma. Center of activity is Woodward County.

Nine wildcats currently are active. Others are expected following a big lease play.

Geologists predict a new oil and gas province ultimately to emerge in this northeastern shelf of the Anadarko basin. The big lure: No less than 100 possible pay zones at reasonable depths (p. 161).

Exploration men for Socal and Humble also apparently think they have a big field prospect in California waters offshore from Summerland.

The companies have ordered a $2 million permanent drilling platform for their joint 5,500-acre lease. It is designed to drill two wells simultaneously with maximum capacity for 25 wells.

Cost of the platform has run expenses on the wildcat lease already to more than $10 million. The companies paid $7,250,000 for the lease and since have conducted expensive core drilling on it.

Results of the coring were kept secret. They apparently were promising in view of the big drilling platform ordered.

It'll be interesting to see how much oil companies offer for two big blocks offshore in Lake Erie put up for bids by Pennsylvania.

The two tracts contain 35,710 acres. They lie in the water gap of an oil and gas trend stretching from Ohio into Ontario and New York.

Other exploration items:

Pakistan Petroleum finally has learned how to tame the Sylhet gas field. After losing two high-pressure wells, the company has a producer. It's the 3 Sylhet which is rated at 100,000 M.c.f. daily open flow. Proved reserves of field are put at 150 billion cubic feet of good-grade gas.

Lousiana's Plaquemines Parish, already established as one of the country's most prolific oil areas, still is a favorite hunting ground for wildcatters. And they're finding more oil. Twenty-seven out of 100 wildcats are successful.

There's a lesson for refiners in how Cosden carefully juggled old equipment at its Big Spring refinery (p. 98).

The reshuffling occurred when the cat cracking unit was expanded. Involved were vessels, compressors, pumps, and drivers on the cat cracker. The result was a minimum of new equipment needed.

In this connection Petroleum Chemicals, Inc., provides an interesting case history (p. 102) on how new equipment was shoe-horned into place in its Lake Charles, La., butadiene plant. The problem was to revamp existing equipment, tie it into new facilities, and keep operating all the while.

Keep an eye on National Petro-Chemical Corp. for new moves in plastics and other fields.

The company plans a big new polyethylene plant probably along the Gulf Coast. It is beefing up its original production at Tuscola with medium density polyethylene and compounding facilities.

Further down the line, National Petro-Chemical is looking at a major

Polyvinyl chloride plant to be built with another company probably midway along the Mississippi. The company also is thinking about butadiene at Tuscola.

Tidewater is more than pleased with its giant new Delaware refinery.

The plant is making 106 research-octane clear product in its reformer-extraction setup.

Its crude unit, rated at 130,000 bbl. daily, has handled up to 150,000.

Alkylation and other units have exceeded design capacity by big margins.

Last unit, a fluid coker, is now coming on stream. When it begins routine production, Tidewater will be in a position to think about petrochemicals. That's expected to be the next development.

A little-publicized development of great significance is taking place at Barber's Hill salt dome on the Gulf Coast.

The once prolific oil field has now become the world's largest underground reservoir for storing L. P. G. Enough salt has been leached out of the big dome to store 6 million barrels of light hydrocarbons, about one-sixth of the nation's underground storage capacity.

Participating in developing this key cog in the Houston area's petrochemical complex and distribution center are Warren Petroleum, Bay Petroleum, Texas Butadiene, and Texas Natural Gasoline. Other pipelines connect additional processors to the big facility.

Texas Eastern Transmission has agreed to pay highest price ever quoted for natural gas for interstate movement.

Price is 22.6 cents per M.c.f. for 100,000 M.c.f. daily from Rayne field, La. Texas Eastern is seeking FPC approval for deal which also calls for $50 million expansion of company system.

Previous high gas price was 21.4 cents for offshore gas.

Bids have been received for second pipeline from Four Corners area.

Texas-New Mexico Pipe Line will start this fall on its 515-mile, 16-in. crude line from Four Corners to Jal, N. M. The Four Corners Pipeline, already underway, will move Paradox basin oil from Utah to Los Angeles.

Notes on other pipeline jobs:

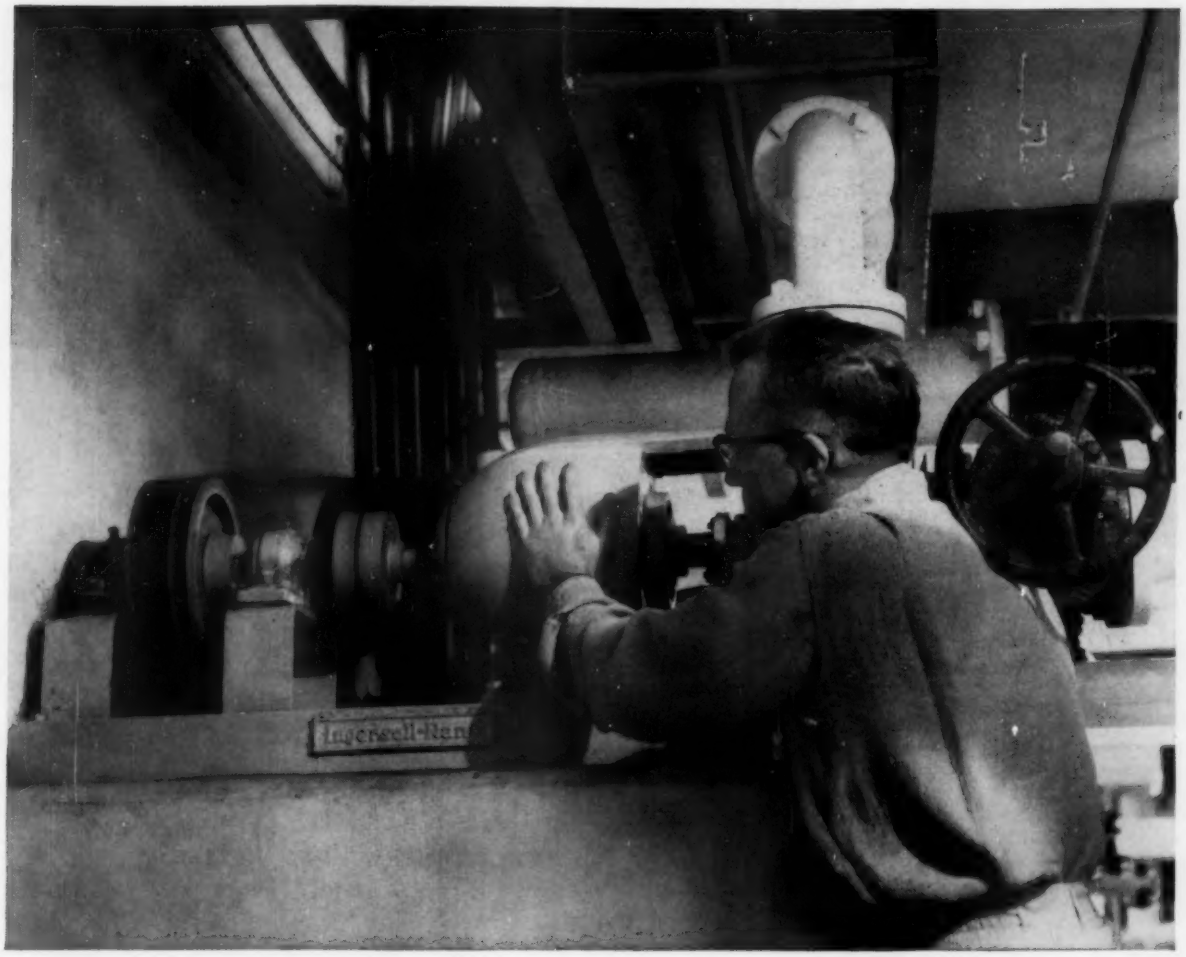
The first Mexican gas flowed into the U.S. last week through a new Texas Eastern Transmission line from McAllen to Beaumont. It's just the beginning of an expected big gas business which should benefit both nations.

Trans-Mountain Oil Pipeline is testing two 50-mile, 30-in. loops that will boost its capacity by 40,000 bbl. daily.

Turnpikes may prove a profitable source of gallonage for marketers.

On the New Jersey turnpike, the 100-millionth gallon of gas was sold recently by Cities Service. Turnpike authorities report 40 million cars are expected to use the route this year with gas consumption running far above estimates.

B.F.Goodrich



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IN THE NEWS

General Interest:

1958 Will Be Big Year for Oil in Congress ... 67
Imports-Control Plan Facing Its First Test ... 78
Sohio's 2-Month Strike Finally Settled ... 80
Traveling in Four Corners? Then Go by Air ... 82

Drilling:

New Drilling Barge Collapses on First Job ... 68
Westates Expansion Includes Purchase of Arrow Drilling ... 75
Socal Orders Platform for Offshore Venture ... 79
Movie-Lot Rig Gets An Exotic Setting ... 80
Four Platforms on Way to Gulf of Paria ... 90

Exploration:

Pennsylvania Opens Lake Erie Play ... 71
Sunshine Stakes Offsets at Washington Strike ... 75
Wildcatters Beat the Odds in Plaquemines ... 84
United Fruit Buys Panama Lease ... 88
Superior Confirms Maracaibo Strikes ... 90
Oklahoma's Woodward Trend Stretches 100 Miles ... 161
Rockies Getting Big Play Still ... 162
Lower Cretaceous Score in Mississippi ... 167

Production:

Ten-Year Battle Ends as Rangely Unitized ... 70
Payout in Bisti Field Still a Question Mark ... 74
Texas Producers Pinched by New Pipeline Proration ... 83
Commission Approves New Recovery Projects ... 83
Headlee Operators Move Quickly to Unitize ... 86

Processing:

Barber's Hill Dome Now World's Biggest L.P.G. Cavern ... 72
Processing Briefs ... 80
Polyethylene Plant Planned by National Petro-Chemical ... 87

Pipelining:

Texas Eastern Brings First Mexican Gas North ... 69
Record Price of 22.6 Cents Paid for Louisiana Gas ... 71
Ditchers Blast Through Rocks on Four Corners Line ... 76
Pipeline Briefs ... 85
More Contracts Let by Four Corners Pipe Line ... 87
Gas Line Proposed From Mexico To Cuba ... 88

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TECHNOLOGY—OPERATION

Drilling-Production

Drilling Cost Accounting Really Works . . . 93
By Douglas B. Wright
The Carl B. King Drilling Co. accounting system puts the accent on time. This can make the difference between profit and loss.

Ebullient Cooling Cuts Costs . . . 110
By J. O. Scott
Sinclair Oil & Gas Co. is finding that removal of heat from engine lube oil by boiling water, simplifies installations and improves reliability of gas-engine-driven compressors.

Pressure Maintenance With Warm-Water Injection . . . 114
By Jack Wahl
Water injection is under way at Pembina in a 160-acre five-spot pattern. The water is heated to 120° F. so that it will reach injection wells at 90° F. and the formation at 129° F. This increase over the 95° F. formation temperature without heating raises injectivity and provides for recovery of 5 per cent more oil.

Field Processing—39: Static Bottom-Hole Pressure in Gas Wells . . . 123
By Dr. John M. Campbell
Here's how to calculate this important production variable.

Pipelining

Variable-Speed Drives Lower Pumping Costs 100
By F. A. Moore
Power costs in pipelining can often be cut up to 25 per cent by the use of a variable speed drive between a constant speed motor and pump.

Pipeline Patrol: Operations . . . 131
Westcoast Transmission Co. is making five overhead stream crossings by means of suspension bridges on its 650-mile, 30-in. gas line from Peace River to Sumas, Wash. Which prime mover should be used for your station, engine or electric?

Refining-Processing

Atomic Experiments Develop Radiation-Resistant Lubricants . . . 97

Cosden Juggles Pumps in Cat Cracker Revamp . . . 98
By Larry Resen
During a 50 per cent expansion in cat cracker capacity, Cosden Petroleum Corp. utilized existing equipment to the fullest. Pump-and-drive units were transferred, altered, and even split for more efficient usage.

How P.C.I. Revamped Its Lake Charles Butadiene Plant . . . 102
Expansion was in the nature of bottleneck removals to increase plant capacity by 20 per cent. The plant is quite compact and the revamping presented problems not often encountered.

PETROdatics . . . 127

The Foreman's Page . . . 128

Questions on Technology . . . 129

Exploration

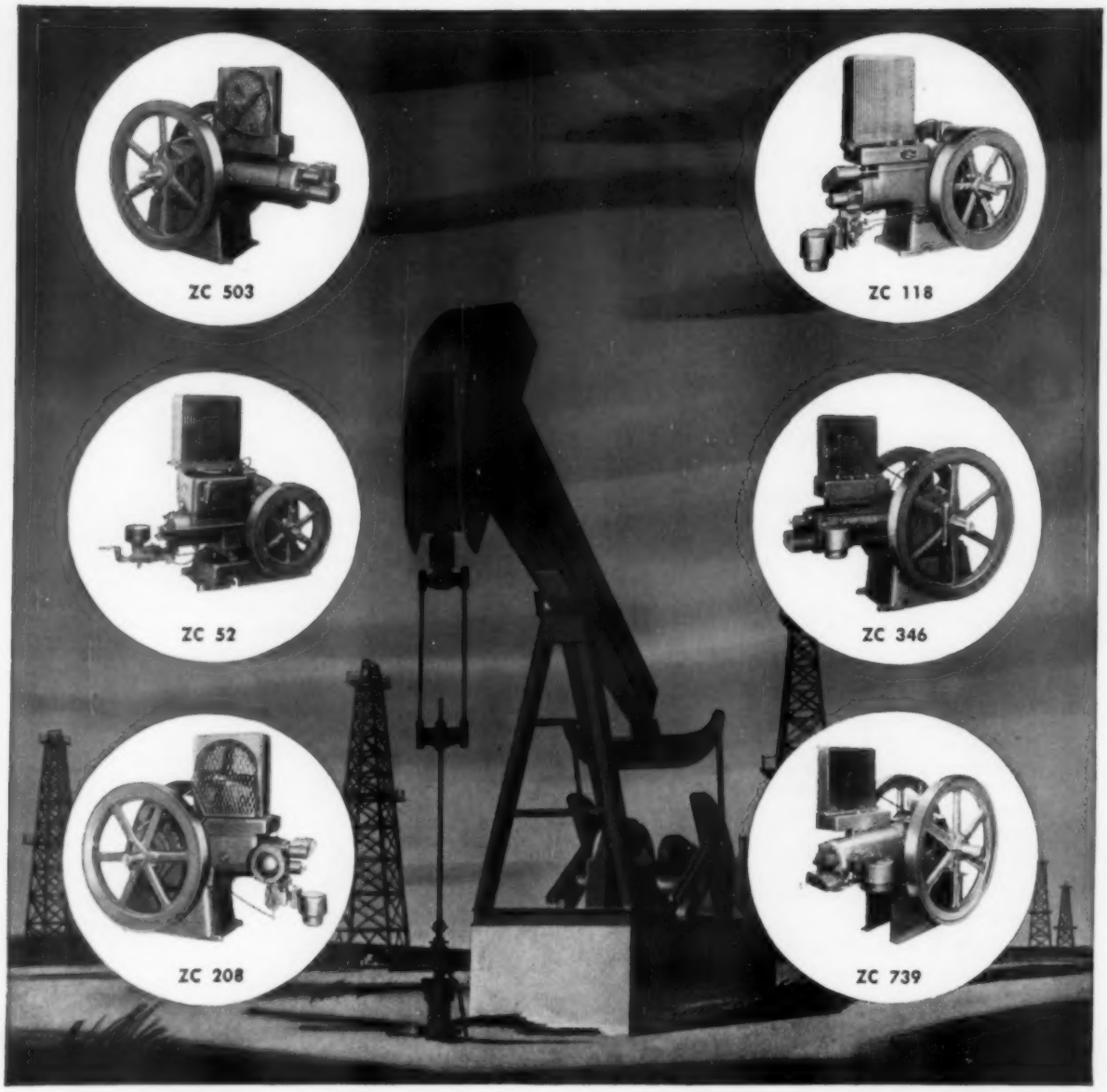
Oil Production in the Natchez Area . . . 112
By G. W. Gulmon, H E. Hansen, and B. L. Simms
Here is a list of the oil fields in the Natchez area of Mississippi and Louisiana. Part 2 of a two-part article.

General

Canadian Vs. American Oil Taxation . . . 107
By A. G. Burton
Canada has revamped her oil-tax laws recently. Here is the whole story. Part 2 of two parts.

DEPARTMENTS

They Say	51	Questions on Technology	129	Deaths in the Industry	180
Calendar of Events	59	Pipeline Patrol	131	Statistical Summary	181
Journally Speaking	63	Drilling Contractors	134	Drilling Statistics	182
Editorial	65	New Equipment	137	Supply Statistics	183
Watching Washington	73	Trade Literature	144	Refining Statistics	184
International News	88	Equipment Men in News	149	Markets	185
PETROdatics	127	Exploration Highlights	161	Classified Advertising	186
Foreman's Page	128	Personals	178	Advertisers' Index	191



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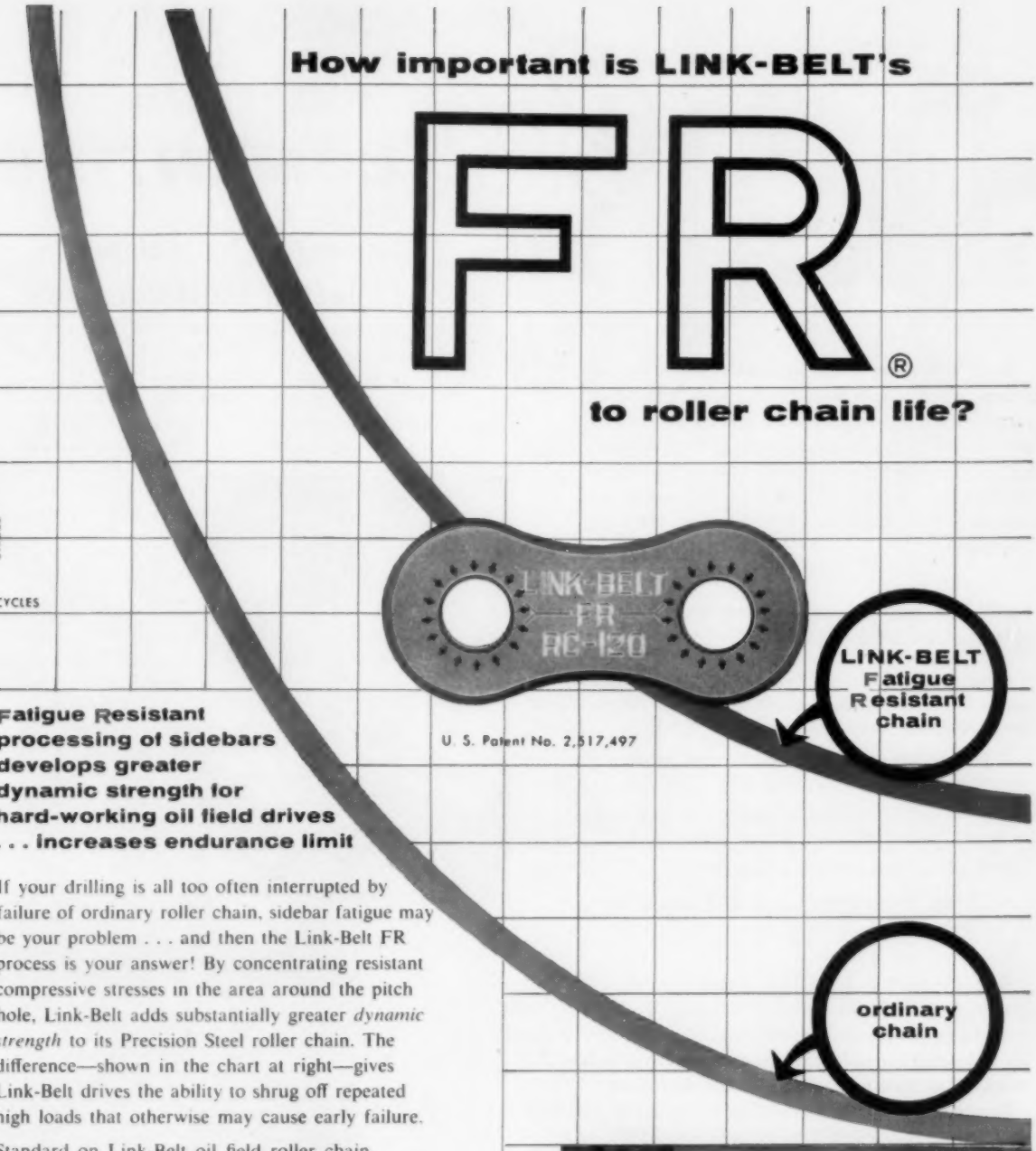

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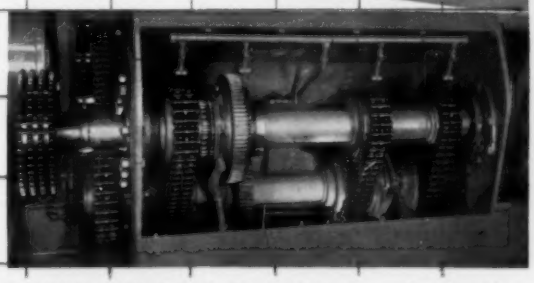

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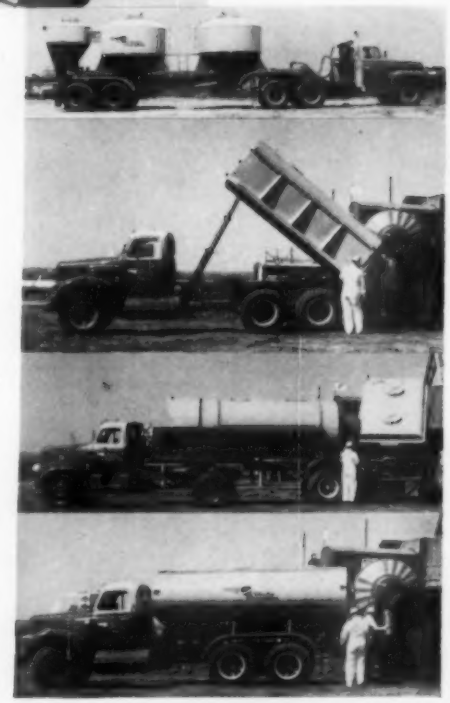

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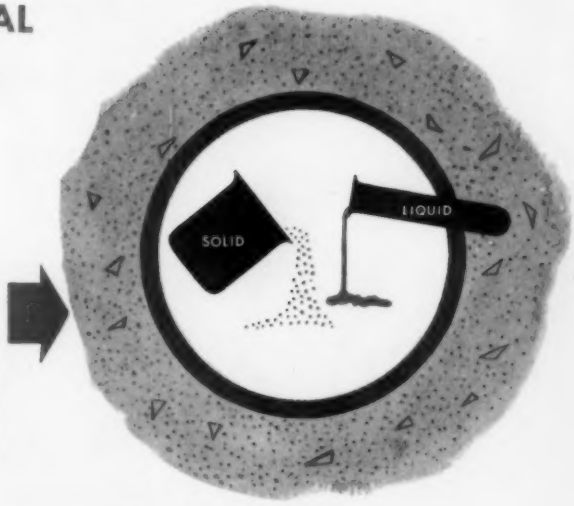

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Hi-Dense is a high specific gravity weight material designed to increase the density of cement slurry for controlling high pressure gas and oil zones. Hi-Dense is ground to a fineness that requires a minimum amount of mixing water. Because of the specific gravity of Hi-Dense, it is possible to weight cement slurries to 20 lbs./gal., yet still maintain adequate pumpability and strength stability at high temperatures.

POZMIX 140

Designed for oil well cementing where formation temperatures range from 140° to 400°F. or higher, Pozmix 140 is a pozzolanic composition made up of Pozmix "A" or "S", hydrated lime and set control additives to give it early initial strength. It contains no portland type cement. At temperatures greater than 140°F., Pozmix 140 equals or exceeds strength specifications for oil well cements and is greater than many other types of cementing compositions when used under the same conditions.

SALT BRINE CEMENT

The dry blending of salt in cementing composition eliminates foaming and delay in dissolving salt in water before mixing with cement. A saturated Salt Brine Cement improves the bond to a salt formation and does not dissolve the salt as would occur with the circulation of fresh water slurries. In deep wells, Salt Brine Cement does not require retardation, as saturated salt brine will sufficiently retard cement to permit placement.

MUD-KIL

Mud-Kil is a dry, granular material that may be mixed in the dry cement or dispersed in the mixing water. It effectively neutralizes the cement-retarding properties of quebracho and other tannins, starch, sodium carboxymethyl cellulose and lignite. Pumping time and compressive strengths of cement are unaffected.

HR-4 CEMENT RETARDER

Halliburton HR-4 is a chemical retarder used in portland or Pozmix Cement to retard the set to allow placement at high temperatures. A small amount of HR-4 is added to the dry cement at the bulk plant or in the mixing water to provide a tailored composition for cementing casing in the deepest of wells.

HR-7 CEMENT DISPERSANT AND RETARDER

Halliburton HR-7 is a chemical dispersant and retarder for use with high gel cement compositions. This additive is effective in obtaining smoother and more fluid gel cement slurries. Most applicable in wells where moderate temperatures prevail.

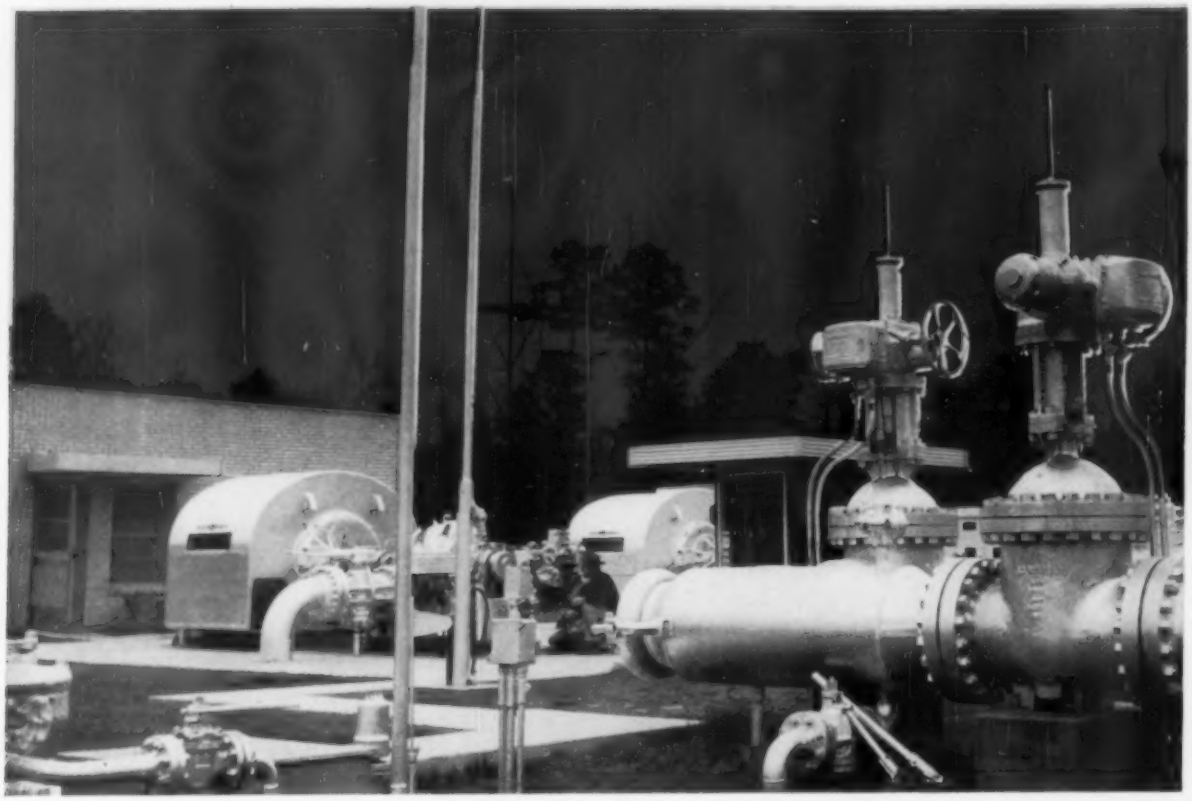
CALCIUM CHLORIDE

An accelerator for Pozmix Cement or portland cement to increase the early strength and reduce the waiting on cement time. Most effective at low temperatures (40-100°F.) for surface pipe or shallow wells.

CEMENTING SERVICES

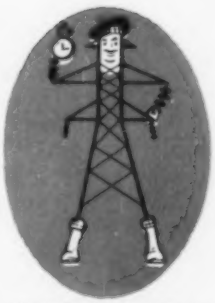
251 SERVICE CENTERS — JUST MINUTES AWAY FROM ANY WELL

PIPE LINE PUMPING MAKES WONDERFUL CHANGE WITH ELECTRIC POWER



Operated by Remote Control

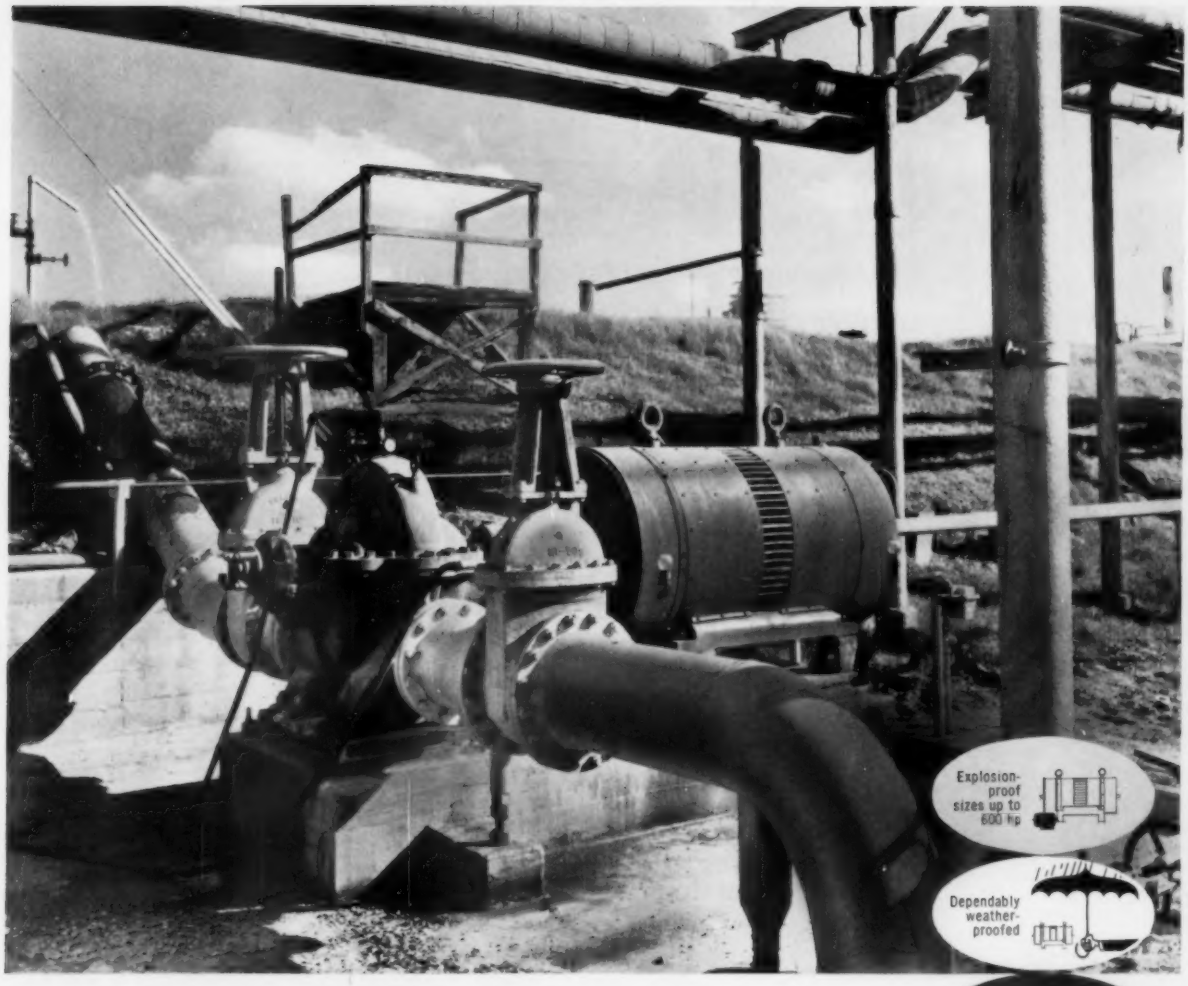
There are over 686,000 miles of pipe line throughout America today – three times the total U.S. railroad trackage. Reason for this big boom is economy of transportation. Closely linked with the economy picture is UTILITY ELECTRIC POWER – the power that has made push-button, fully automatic pipe line operation possible. When you have deliveries to make on schedule – at low cost – without the usual worries of station down-time, etc. – USE UTILITY ELECTRIC POWER. It's the sure way to be modern, more progressive and make more money.



I'M LCP – Low-Cost Power on the Job 24 Hours Daily

PETROLEUM ELECTRIC POWER ASSOCIATION

P. O. BOX 2771 DALLAS, TEXAS



A dependable guard for petroleum outposts

Louis Allis explosion-proof motors need little attention

Once installed in your unattended locations, Louis Allis fan-cooled, explosion-proof motors can be virtually forgotten. They're designed to assure long, trouble-free service with a minimum of attention. That's why you'll find them in countless remote installations, like the above 450 hp pump-motor application at a large refinery in the Southwest.

These dependable motors incorporate insulation that resists heat, moisture, and corrosion. What's more, the sturdy completely-enclosed cast-iron housing is perfect protection against rough weather — shrugs off rain or sandstorms with equal ease, and ignores even the corrosive effect of saltwater spray.

Generous bearing sizes and ample provision for lubrication assure minimum maintenance attention and long, trouble-free bearing life.

You will like these motors for remote installations. Ask your Louis Allis District Office for Bulletin 800 — or for engineering assistance. Or write The Louis Allis Co., 449 E. Stewart Street, Milwaukee 1, Wis.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

"Take It From Me, Brother...!

"...I KNOW *Racebilt* Aluminum Industrial Pipe Is The Best In The Field!" HERE'S WHY:

No bare tube ends to be damaged.
Racebilt pipe has cast aluminum male and female ends!

No threads or twist locks which require tools; no "freezing" or "galling".
Racebilt pipe goes together with a simple push and a twist, no tools needed; no "freezing" and "galling" because there are no threads!

No weakening of the pipe by flaring or grooving.
Racebilt pipe has full thickness and full strength the entire length of the pipe!

Here's What One Internationally Recognized Contractor says about Racebilt Industrial Pipe . . . . . .

"Our recent use of Racebilt Industrial Pipe was for air transmission in locations which were very difficult and was supported mainly by wire from trees in a rough and rocky canyon. The results were most satisfactory. There were no leaks and pressure loss in 2,900' was less than we have ever experienced in any similar operation"

No loose parts to be lost or damaged.
Racebilt cast couplings and male ends are permanently welded to the tubing; each length is a complete unit!

And Check These Plus Features:

Racebilt pipe has the highest pressure rating of any in the field—up to 600 psi. . . . Racebilt is the only pipe used in the rental business, where it gets the most abuse and rough handling. . . . Racebilt lays faster than any other pipe—10 times faster than steel and many times faster than any other aluminum pipe!

WRITE TODAY FOR FULL DETAILS, NO OBLIGATION, OF COURSE!

Racebilt
THE MARK OF QUALITY

Race and Race, Incorporated **Winter Haven, Florida**

Manufacturers of Aluminum Pipe For Farm and Industry

There's a *Flying "R"* near YOU!

The FLYING "R", symbol of REPUBLIC SUPPLY is ready to serve you just about anywhere you happen to be located in the oil industry . . .

60 STORES and SALES OFFICES TO SERVE YOU!

Our 47 REPUBLIC SUPPLY stores are stocked with leading, nationally known oil field supplies and equipment.* Thirteen sales offices are located in cities which are headquarters for all divisions of oil country operations.

Courteous, experienced personnel are ready at all times to give you information and serve your supply and equipment needs. REPUBLIC SUPPLY'S combination of experienced personnel, quality products and wide coverage assures you of satisfactory service.

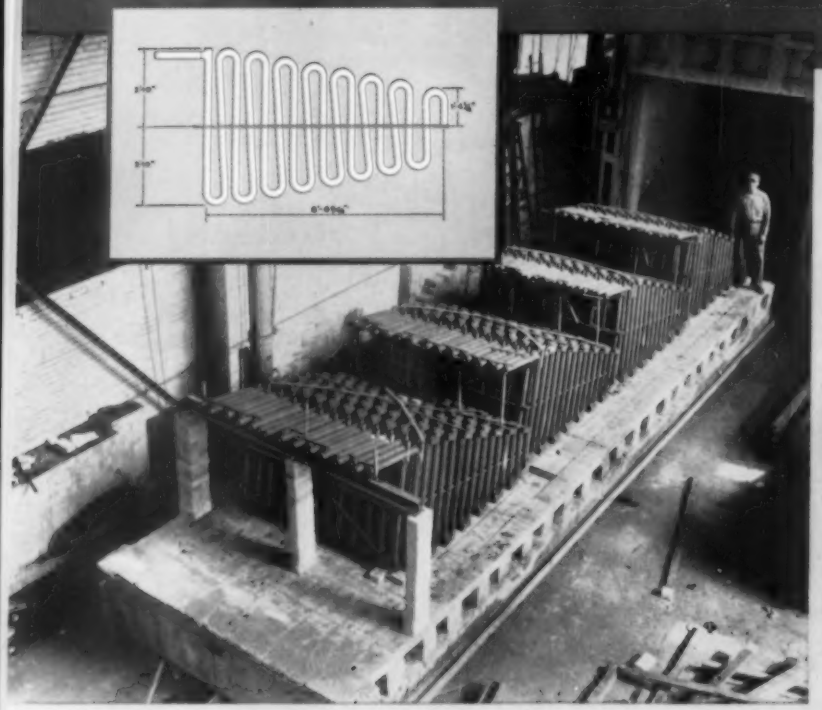
Regardless of where you are in the oil industry . . . You're not far from a FLYING "R."

*The Grants, New Mexico store, now under construction, will feature MINING supplies and equipment.

Republic Supply
COMPANY
OKLAHOMA CITY 1, OKLA.

MIDWEST PIPE COILS

Meet the MOST EXACTING Specifications



FULL FURNACE ANNEAL

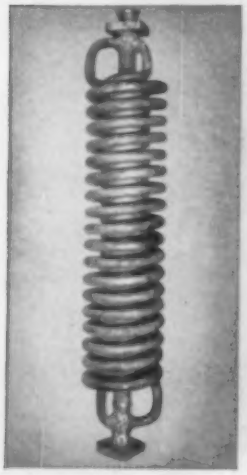
Furnaces of giant size enable us to anneal large coils under closely controlled conditions. Shown here is set of 48 kiln cooling coils 2⅛" OD x .165" wall bent on 6" centers with maximum reduction of ⅛" on OD. Material is 7% Cr—½% Mo.

Do you need coils

- . . . that are full furnace annealed
- . . . of intricate design
- . . . to comply with codes
- . . . with bends to close centers
- . . . to accurate dimensions
- . . . made of stainless steel or other corrosion resistant or heat resistant pipe?

We make coils of any size, shape or contour . . . of any pipe which can be bent and welded. Equipment includes the most modern bending and coiling machines . . . furnaces large enough for full furnace anneal. Welding and coiling techniques are the most advanced, developed through long experience.

Here are just a few of the types of coils we make regularly. Send us your specifications.



DOUBLE COIL

Diameter of inside coil is only 8" while outside is 14". Made of 1⅛" OD x 1⅛" ID 4-6% Cr—½% Mo tubing and full furnace annealed.

304 STAINLESS-SANITARY FINISH

Double cylindrical coil of 3" OD by 14 gauge, Type 304 stainless steel. All welds ground to sanitary finish.

KETTLE COIL

Made of 1" Schedule 40—316 ELC. Finished coil was heated to 1950°F and water quenched.

7677

MIDWEST PIPING COMPANY, INC.

Main Office: 1450 South Second St., St. Louis 4, Mo.

PLANTS: ST. LOUIS, CLIFTON, N. J. and LOS ANGELES

SALES OFFICES:

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MIAMI 34—2103 LE JEUNE RD. • NEW YORK 7—50 CHURCH ST.
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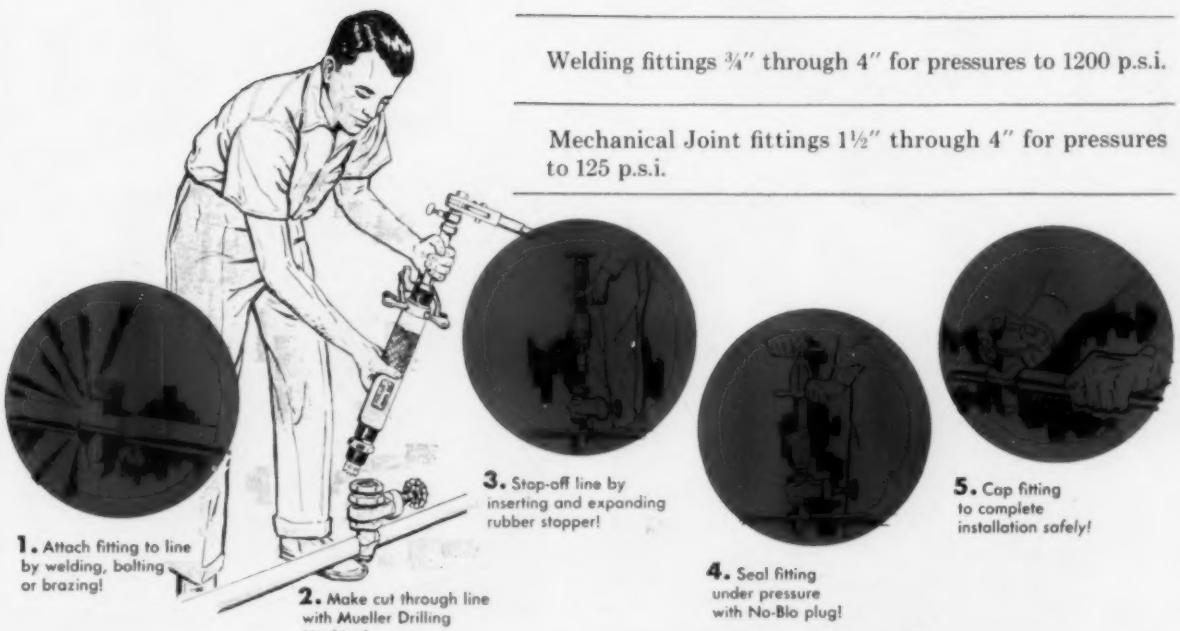
Stop-off small lines safely!

Repair, replace, tie-in or extend small lines by stopping-off under pressure with Mueller® Line Stopper Fittings and Equipment. Fittings may be used singly for complete stop-off or in pairs to isolate a section of line. Flow of fluid may be carried around an isolated section by using the built-in by-pass connections in the stopping machines or a separate by-pass line. When work is completed, the exclusive NO-BLO® plug is screwed into the top of the fitting under pressure. The plug then seals the fitting while the valve and equipment are removed. A cap provides a double seal and completes the installation.

Welding fittings ¾" through 4" for pressures to 1200 p.s.i.

Mechanical Joint fittings 1½" through 4" for pressures to 125 p.s.i.



1. Attach fitting to line by welding, bolting or brazing!

2. Make cut through line with Mueller Drilling Machine!

3. Stop-off line by inserting and expanding rubber stopper!

4. Seal fitting under pressure with No-Blo plug!

5. Cap fitting to complete installation *safely!*

Other line stopper fittings and equipment for their use are available in sizes from 6" through 12". See your Mueller Representative or write direct.

NO-BLO®

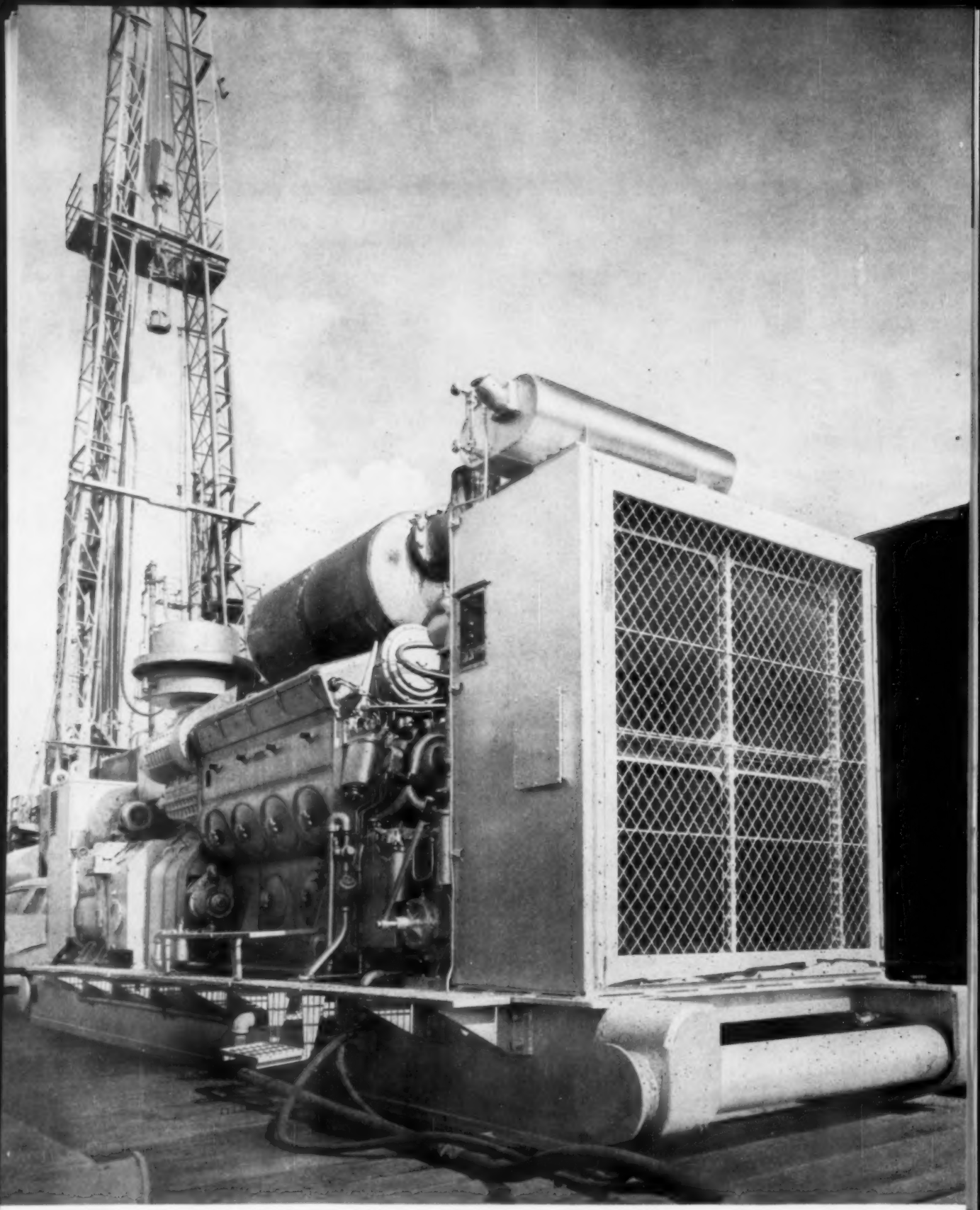
Since 1857

MUELLER CO. 100th YEAR SERVING the Water and Gas Industries QUALITY

MUELLER CO.

DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles, In Canada: Mueller, Limited, Sarnia, Ontario



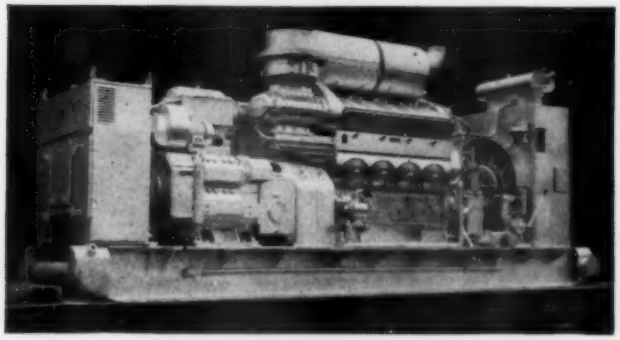
In operation on Sun Oil Company's Rig 15 at Rayne, La. is Electro-Motive's new drilling power unit, the SR-10. Main features include increased engine hp, increased generator and drive motor capacity, lighter weight, integral AC generator, simplified maintenance and load regulator control.

Announcing
a significant advancement in
deep well drilling power

New Electro-Motive SR-10 Power Unit

In 1955, Electro-Motive introduced the first fully integrated Diesel-electric power system for oilwell drilling. Success of these units is demonstrated by the fact that Electro-Motive Power is widely used by drilling companies throughout the Gulf Coast area.

Now, Electro-Motive offers another first and significant contribution to the oil industry's increasing need to drill deeper, faster and more economically — the first standardized, completely self-sufficient Diesel-electric power system. These are its features:



The SR-10 is a refinement of Electro-Motive's original plan to build a *complete* and integrated Diesel-electric system designed and built to work as a unit with one manufacturing responsibility.

For detailed specifications on the new SR-10 unit, contact your Electro-Motive representative in any of the cities listed below.

INDEPENDENT AC SUPPLY

A new integral AC generator (100-KW) makes the SR-10 completely independent of outside supply for its own AC needs—blowers, exciters, control equipment.

INCREASED POWER

Engine horsepower has been increased to 1000. New D49-G generators produce up to 640-KW each (2 per engine). New D49-M drive motors deliver up to 800 horsepower.

GREATER POWER UTILIZATION

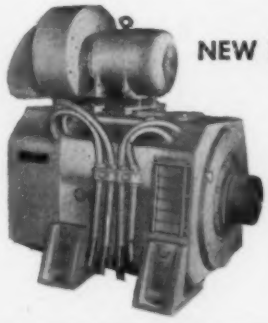
New load regulator provides load balance between units. Thus, if power requirements exceed that available on one unit, the load regulator automatically loads a second unit to satisfy drilling demands.

REDUCED MAINTENANCE

New improved motor control cabinet is simpler and more efficient. Its new design combines with many other improvements, both electrical and mechanical, to appreciably reduce overall maintenance time and expense.

LIGHTER WEIGHT

A new speed-increasing transmission between the engine and generators and other changes have cut the weight of the air cooled unit by more than 2000 pounds.



NEW D49-M DRIVE MOTOR

Improvements in design and materials of both the new motor and generator have appreciably increased horsepower and provided for better moisture protection. Motors and generators are identical except for field windings, a factor that facilitates service and reduces costs.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS • La Grange, Ill.

In Canada: General Motors Diesel Limited, London, Ontario
Petroleum industry sales offices: Dallas and Houston, Texas; Morgan City, Louisiana; Los Angeles, California.

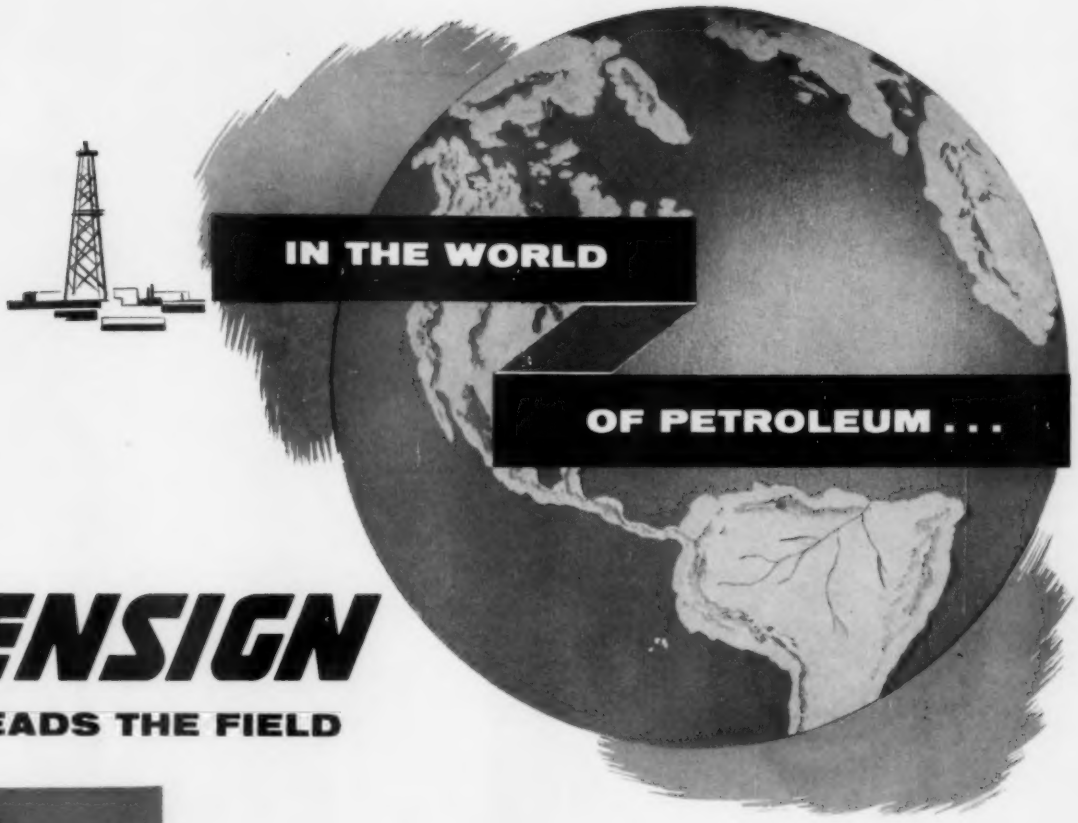
Magcobar's® NEW! MUD FUNNEL

- Made of Durable Plastic
- Easy to Clean—Smooth, No Ridges
- No Paint to Peel Off
- No Rusting—No Corrosion
- Low Heat Transmission—Never Too Hot to Handle from Hot Mud
- Retains Its Shape—No Denting
- Attractive—Retains Original Color
- Stainless Steel Screen
- API Specifications

$5 Available from Magcobar Dealers and Supply Stores

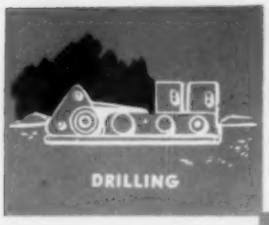
Magcobar
Complete
DRILLING MUD SERVICE

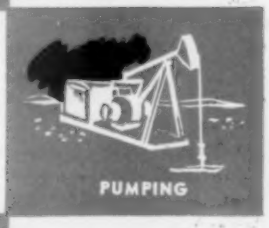
Magnet Cove Barium Corporation
Houston, Texas



ENSIGN

LEADS THE FIELD

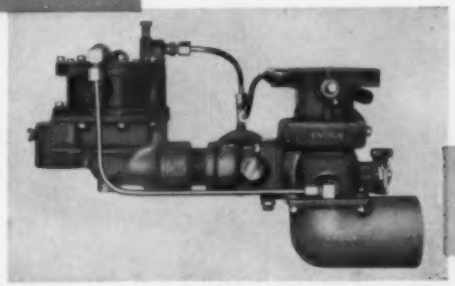




Gas Engine Carburetion

Gas engines operating in the remotest parts of the world, frequently in the hands of the most inexperienced, must be easy to start, easy to operate and easy to service. This calls for gas carburetion that is simple in design and rugged in construction. Toward this end ENSIGN engineers have concentrated their efforts and resources for nearly half a century. Results of this concentration of purpose are measured in terms of unparalleled gas engine performance. Proof of this comes in a quick glance at the gas engine market. Today hundreds of thousands of ENSIGN carburetors are in a 'round-the-clock operation throughout the world rendering indisputable evidence that engines equipped with ENSIGN can be depended upon to perform well under all conditions.

DEALERS AND DISTRIBUTORS IN ALL PRINCIPAL OIL FIELDS

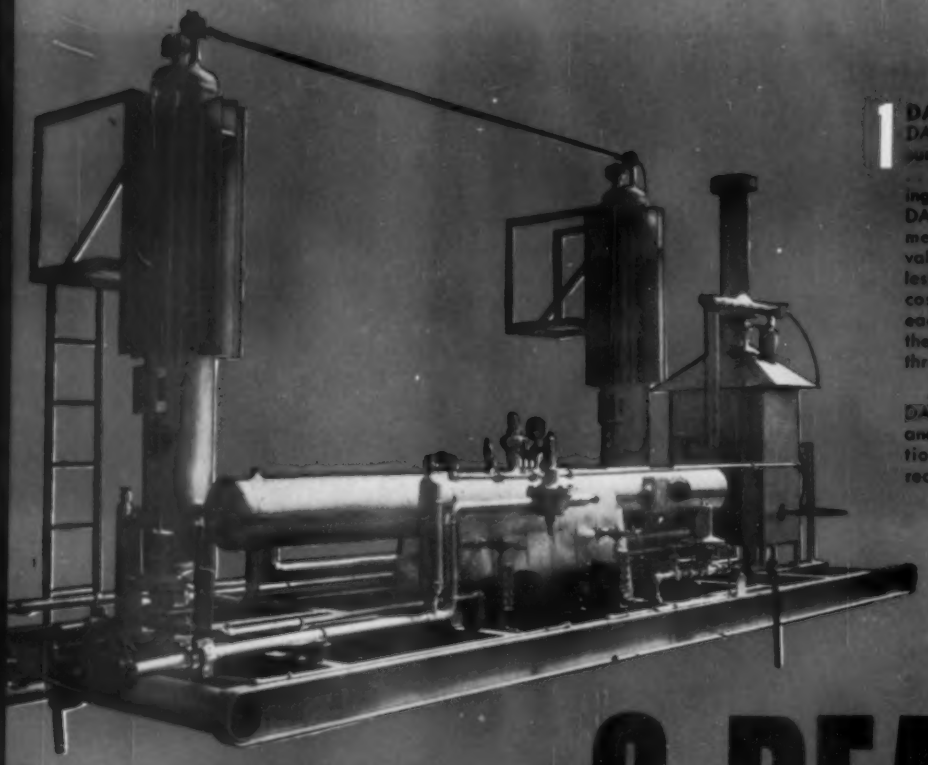


ENSIGN

CARBURETOR COMPANY

1551 E. Orangethorpe, Fullerton, California

Branch Factory: 2330 W. 58th Street, Chicago, Illinois



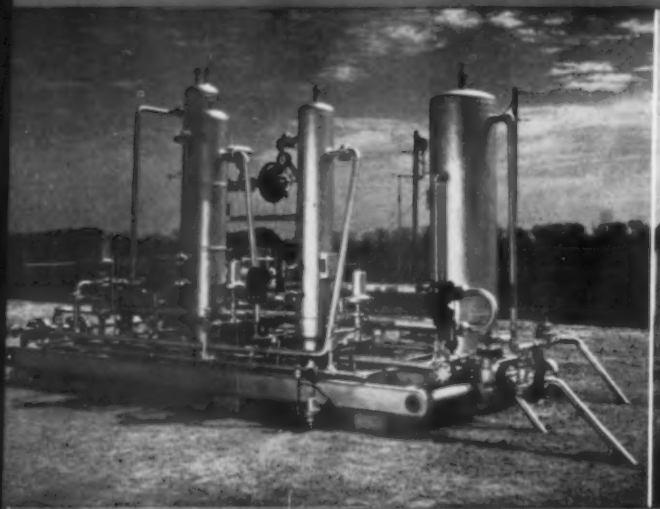
6 REASONS

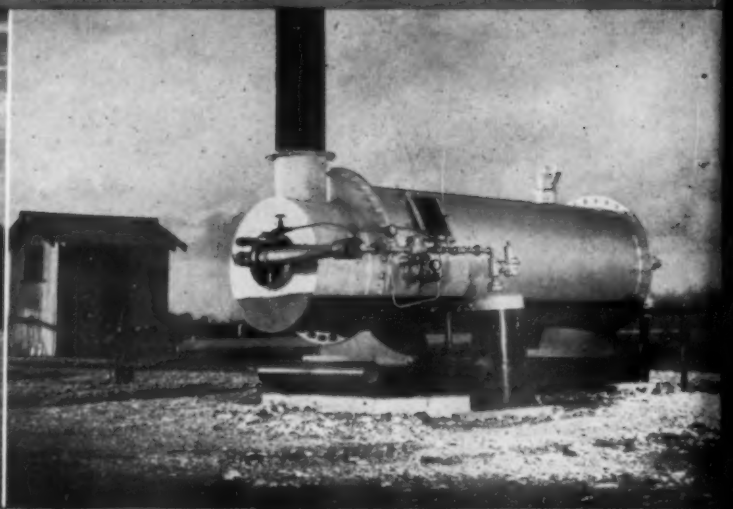
1 **DAU . . . a Parkersburg exclusive! With DAU, wellhead dehydration of high pressure gas wells is possible for the first time . . . and with real economy, too. Your savings start with the low cost of unit. The DAU requires no costly auxiliary equipment such as separators, piping and valves. Because the DAU uses 80 per cent less fuel gas, your savings on operating costs can amount to hundreds of dollars each month. And checking corrosion at the wellhead saves on equipment wear throughout the flow system.**

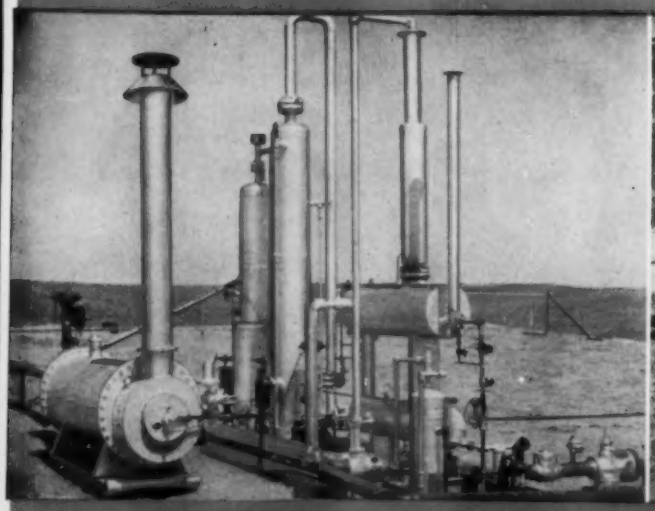
Available in two basic types: (1) The DAU Weldrier for wellhead dehydration; and (2) The DAU Wetsorber for combination dehydration and hydrocarbon recovery.

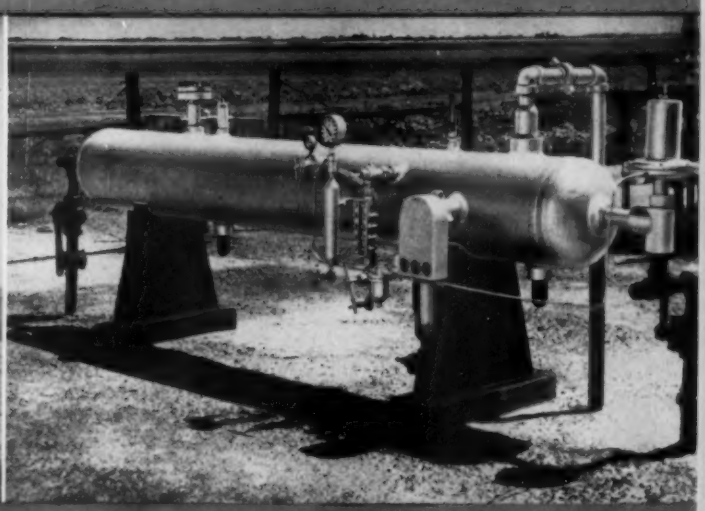
2 **HYRECO . . . another significant Parkersburg development. Parkersburg pioneered the design and development of this equipment to obtain high recovery rate by cold separation. Top performance attained through such Parkersburg features as use of horizontal and vertical separators to isolate warm liquid zone from cold gas zone for maximum recovery and minimizing danger of freezing; vertical knockout for complete removal of liquids before well stream enters cold zone of high pressure separator; and liquid level controller, used to regulate elimination of hydrocarbons from warm zone of separator, that gives hair trigger sensitivity, freedom from freezing, and freedom from plugged bleed holes. Available in capacities from 2.5 to 15 MMCF/D; pressures from 2000 to 6000 psi with either single tube or twin tube vertical knockout for liquid removal.**

3 **HEATERS . . . superior quality and performance. Parkersburg heaters are available in both direct fired and indirect heater types with capacities from 90,000 to 4,000,000 BTU's. Exclusive heating tube design eliminates hot spots and scale deposits, gives more efficient, economical and dependable service. Indirect heaters now feature new, modern jet-type burner and pilot that requires no air-fuel adjustment, gives maximum flame stability because only primary air is used with fuel gas, and, because of design of wall-tight burner box and flame stability, is practically immune to ill effects from crosswinds. Finest auxiliary control equipment available insures peak effectiveness. All valves and regulators used on Parkersburg heaters are designed for oil field application.**









4 **GLYCOL TYPE GAS DEHYDRATOR** ...a self-contained, completely automatic unit that will eliminate most hydrate problems. Proven performance in extremely cold temperatures. Economical operating cost, using natural gas as source of power. Available in standard sizes to handle up to 10,000 MSCFD and up to 1500 psi operating pressure.

5 **OIL AND GAS SEPARATORS** . . . available in vertical and horizontal types. Parkersburg single-tube separator gives more gas flow area, more interface area and more retention time for greater separation. Whether your need is for a single-tube, two stage, three phase, vertical or metering separator, there is a Parkersburg separator to fit your requirements.

WHY

Parkersburg

Is the First Name in Production Processing Equipment

We are known by the equipment we keep. Parkersburg production processing equipment is the recognized leader in the field . . . a leadership gained through pioneering new designs and applications of equipment to meet any field problem. Operators everywhere buy Parkersburg with confidence because they know the superior performance that is built into each piece of equipment. If it is a Parkersburg, it is designed right and built right for leadership and engineered to meet specific field conditions.

The Parkersburg representative in your area will appreciate the opportunity to discuss specific equipment needs with you.

6 **EMULSION TREATERS**... designed to cover a wide range of applications. Safe and easy to operate. Equipped with unitized fuel gas control line and wind-proof burner control hood. Large free-water knockout capacity, adequate oil settling height. You get more specific separation of emulsion into clean oil and water, greater maintenance of high gravity oil.

AT PARKERSBURG, QUALITY AND SERVICE HAVE GONE HAND-IN-HAND FOR 60 YEARS!

Parkersburg

RIG AND REEL COMPANY

3345 WINTHROP AVENUE • FORT WORTH 16, TEXAS

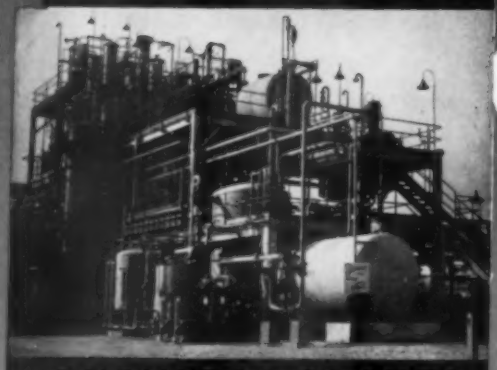
DIVISION OF PARKERSBURG-AETNA CORPORATION

PESA

DROP FORGED STEEL

valves, fittings and flanges by Vogt

REFINERIES



CHEMICAL PLANTS

POWER PLANTS

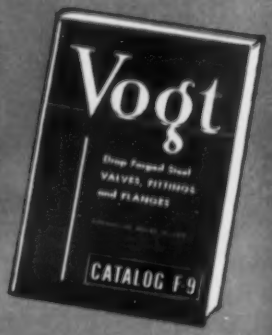
USED and TRUSTED by the NATIONS KEY INDUSTRIES

There are good reasons behind the trust which America's key industries have placed in Vogt valves, fittings, and flanges for half a century. They know that *drop forged materials* are uniform in structure, fine grained, and free from porosity. They know, too, and appreciate the meticulous care given these products through every stage of forging and machining in Vogt's modern shops, and about the many rigid tests and inspections. And that is why these products enjoy such an impressive record of performance in withstanding the shocks and stresses imposed by high or low pressures and temperatures and in resistance to erosive and corrosive conditions.

Service is another important factor in this confidence because Vogt maintains the world's largest and most complete stock of drop forged steel valves, fittings, and flanges always ready for immediate shipment.

Write for Catalog F-9. Consult its 400 pages for the complete Vogt line of drop forged steel valves, fittings, and flanges for oil, steam, water, air, gas, and refrigeration services.

ADDRESS DEPT. 24A-PO



HENRY VOGT MACHINE CO., LOUISVILLE, KY.

BRANCH OFFICES: New York, Philadelphia, Chicago, Cleveland, St. Louis, Dallas, Charleston, W. Va.

HENRY VOGT MACHINE CO. 75th Anniversary LOUISVILLE, KY.

THEY ARE BETTER

THEY ARE PROVEN

THEY COST LESS

JOHNSTON
Hydraulic
PUMPING UNITS

From grass roots to 9000 feet—that's the range of Johnston Hydraulic Pumping Units. More than 100 of these units are now in service (Gulf Coast, South Texas, West Texas), and have been operating for a sufficient length of time to prove their merit.

The low price of Johnston Hydraulic Pumping Units is due to streamlined, simplified design and manufacture, made possible by years of experience in production and hydraulics.

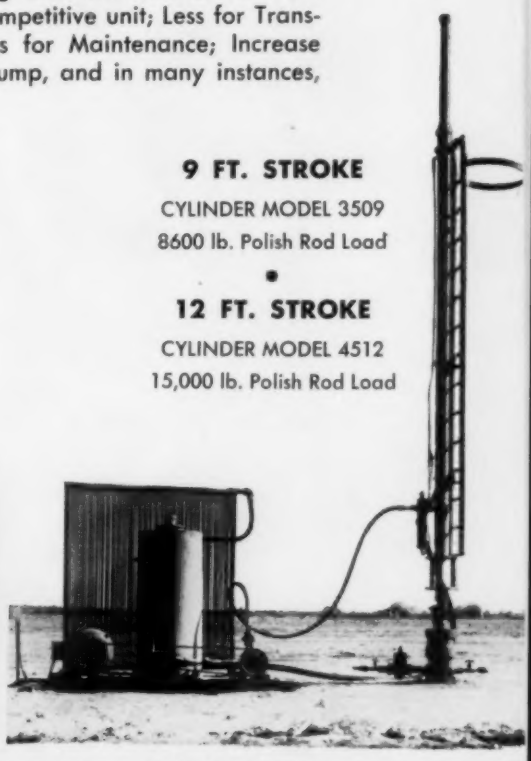
Remember this: Here is a pumping unit that will SAVE YOU MONEY—Cost You Less than any competitive unit; Less for Transportation; Less for Installation; Less for Maintenance; Increase Life of Sucker Rods, Bottom Hole Pump, and in many instances, increase production.

6 FT. STROKE
CYLINDER MODEL
3006
6000 lb. Polish Rod Load

9 FT. STROKE
CYLINDER MODEL 3509
8600 lb. Polish Rod Load

•

12 FT. STROKE
CYLINDER MODEL 4512
15,000 lb. Polish Rod Load



THE "PEE WEE"
3-Ft. Stroke
CYLINDER MODEL
2503
4000 lb. Polish Rod Load

MAIL THIS COUPON FOR SPECIAL PAMPHLET CONTAINING APPLICATION CHART AND MECHANICAL FEATURES OF JOHNSTON HYDRAULIC PUMPS . . . NO OBLIGATION.

ENGINEERED OIL TOOLS, INC.
P. O. Box 1665 • Houston, Texas
Please mail special pamphlet on Johnston Hydraulic Pumps to:

Company

Person

City State

DISTRIBUTED THROUGH SELECTED SUPPLY STORES BY

ENGINEERED OIL TOOLS, INC.

1710 BURNETT ST. — HOUSTON, TEXAS

Faster Than the Hand

There's not a single machine in the shop at the Oil Center Tool Company that thinks for itself.

The best engineers available, the best craftsmen available are paid well to do that.

But, some of the machines come pretty close to being self-contained "brains."

"Hand made" products no longer denote perfection. Uniformity, quality and specialization are better achieved on the automatics.

And if the future does yield a real robot for the machine shop, O-C-T will have it.

The most modern, the most efficient in tools, automatic and otherwise,—that's another reason for the supremacy of O-C-T products.

Precision, specialized well control equipment isn't turned out by hand . . . it's turned out with machines faster than the hand.

Oil Center Tool Company got along pretty well back in 1927 with one milling machine, a drill press, shaper and two engine lathes in an 18 x 20-foot shop.

Today, the company's plant occupies more than 55,000 square feet of floor space with all facilities covering 13½ acres. That's only temporary, of course. Expansion is always under way.

O-C-T machines, like O-C-T products, are specialized and versatile.

The little ones turn out big jobs and the big ones sometimes turn out little jobs.

O-C-T machines take raw, dull-looking hunks of iron and steel and convert them into gleaming pieces of well control equipment that can handle the toughest, the most complicated assignments.

For example, two recent additions to the machine shop cost about $100,000 each.

Their purpose?—Mass production that still imbues the product with an individual personality.

The units can be preset to do specific chores, automatically boring huge castings; boring vertically or at angles; boring tapered holes, holes the same size—all with super speed.

The nerve center of these robot giants is a complicated case of delicate electronic equipment.

In the midst of an automatic boring job, these machines can be halted, switched over to manual control to turn out an emergency job, and then placed back on its original work with no time lost in resetting controls.

Ultra modern machine shops is one reason why O-C-T continues to set production records.

But production records mean nothing unless the products are precision-made.

And the O-C-T formula of advanced machines plus skilled workers results in the precision needed . . . in volume . . . by the oil industry.

At O-C-T they can not use aged machines to be first in the machine age.

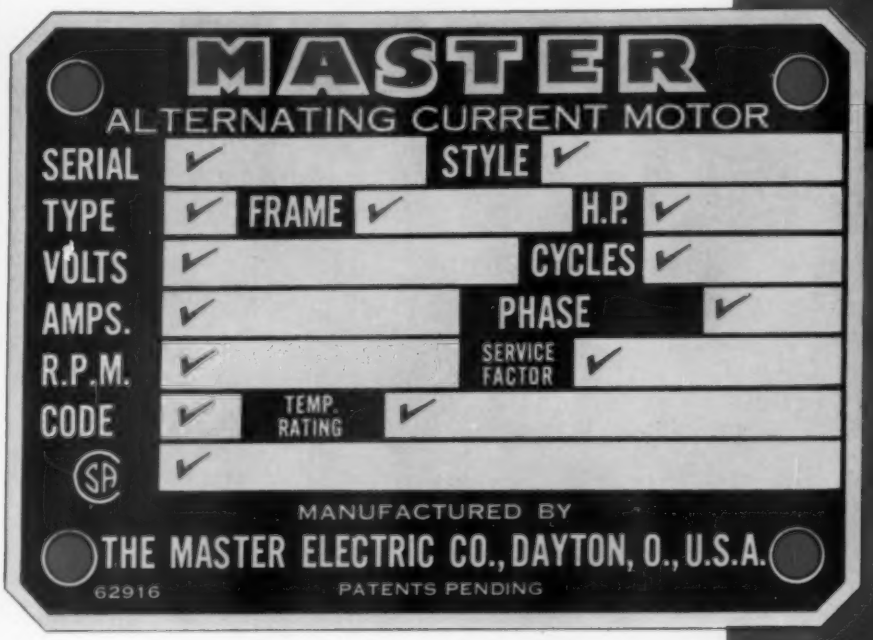
O·C·T

OIL CENTER TOOL CO.

Export Representatives: South America — East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

THEY COST O-C-T nearly $100,000 each, but these two new automatics will get emergency jobs to oil operators days earlier.

Write your own ticket—



What are your power drive requirements? Here at Master, with the widest selection in the nation to choose from, you're sure to fill your needs quickest and best.

Need something special in gear reduction—electric brakes—variable speed operation—fluid drive or special mounting? Or would some of our standard models (⅛ to 400 H.P.) fill the bill? You'll find the answer here! And remember, all Master components are engineered to form combinations of units in one streamlined, compact package of efficiency. Name your need and the name that fills it is Master—for greater salability of motor driven products; for increased productivity of plant equipment.

Motor Ratings—⅛ to 400 H.P. All phases, voltages and frequencies.

Motor Types—Squirrel cage, slip ring, synchronous, repulsion-start induction, capacitor, direct current.

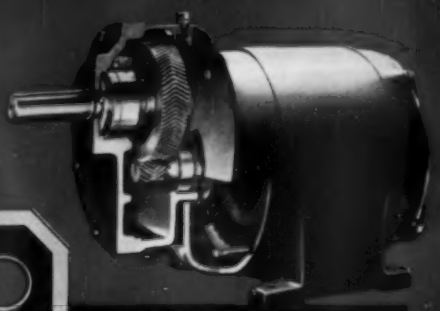
Construction—Open, enclosed, splash-proof, fan-cooled, explosion-proof, special purpose.

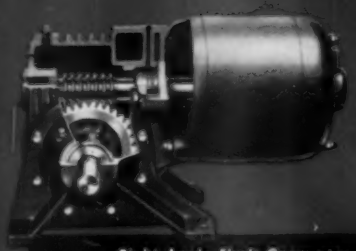
Speeds—Single speed, multi-speed, and variable speed.

Installation—Horizontal or vertical, with or without flanges and other features.

Power Drive Features—Electric brakes (2 types)— 5 types of gear reduction up to 432 to 1 ratio. Mechanically and electronically-controlled variable speed units—fluid drives—every type of mounting.

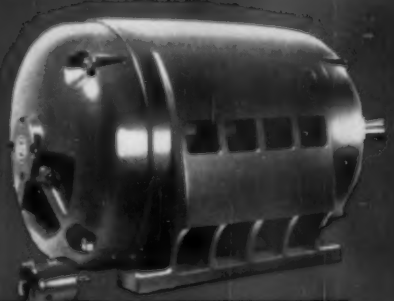
THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO


Parallel Shaft Gearmotors

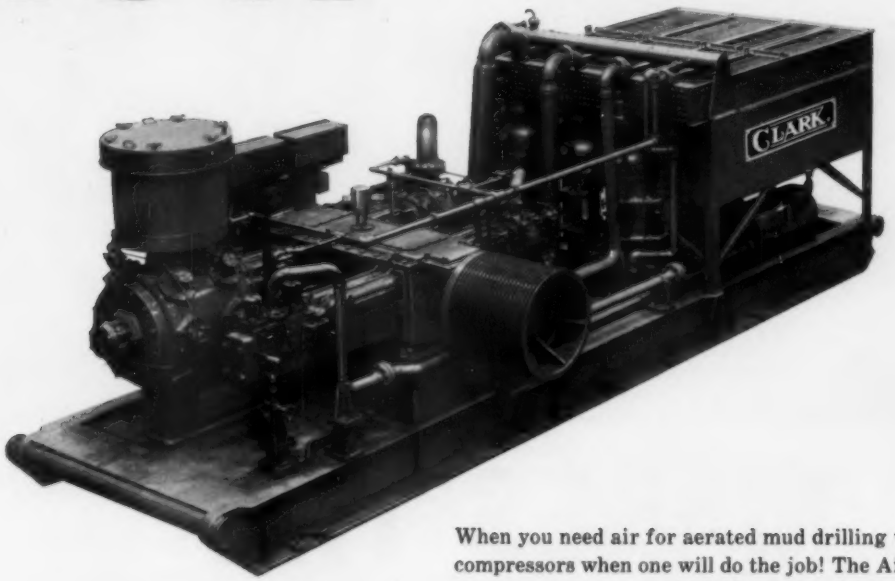

Right-Angle Shaft Gearmotors

Unibrake Motors

Speedrangers


Standard Motors—⅛ to 400 H.P.

NOW all the air you need for drilling from one compressor



When you need air for aerated mud drilling why use a dozen compressors when one will do the job! The Air-Pac packaged air compressor has proved highly successful in field service.

The Air-Pac is a completely automatic 500 horsepower compressor, belt-driven off the rig's compound. The Air-Pac will automatically maintain any desired discharge pressure between 500 and 1500 psi. An automatic controller also holds the input horsepower steady over the complete range of pressures to eliminate engine stalling. The balanced/opposed design of the compressor means you don't have to fuss with it when you install it. Set it on timbers . . . it won't "walk" away. There is nothing intermittent about the Air-Pac either . . . use it for one or 5000 hours.

Low pressure units are also available for air drilling, incorporating all the features of the high pressure aerated mud unit. For a packaged air compressor that's just as rugged as the rest of your rig . . . be sure you look into the Clark Air-Pac.

"On the job." Notice that AIR-PAC is not bolted down. Strut rods to rig maintain belt tension.

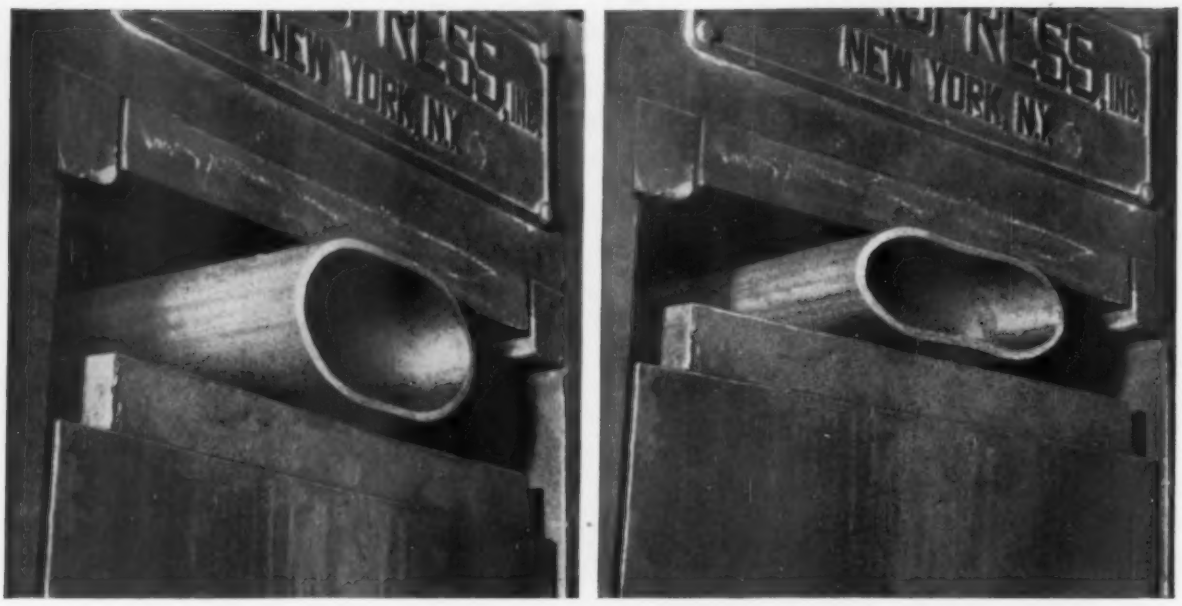
CLARK BROS. CO. **OLEAN, NEW YORK**

One of the Dresser Industries

Offices in Principal Cities Throughout the World

CLARK **Air Drilling Compressors**

DUCTILITY



MAKES THE DIFFERENCE

when Kaiser Pipe meets the press!

ONLY the soundest welds, joining an extremely ductile steel, could stand the strain of the pipe-flattening test shown here.

We know, of course, that no electric weld pipe would ever be subjected to such rigorous conditions in the field.

Still, at Kaiser Steel we want to be *sure*.

So—52 times along the way from iron ore to finished pipe—we run exhaustive tests to keep the quality high.

We measure our pipe's strength and ductility. We inspect it thoroughly for roundness... concentricity... accuracy of dimension.

Thus, when you specify electric weld pipe from Kaiser Steel, you can be *certain*. Certain of performance to match your most exacting demands. Certain, too, of service when and where you need it.

Kaiser Steel

built to serve the growing West

Steel Mill Products: plates • hot rolled strip and sheet • cold rolled strip and sheet • tin plate • continuous weld pipe • electric weld pipe • alloy and carbon bars • bar shapes • structural shapes • semi-finished steels • pig iron • ingot molds • coke by-products • **Fabricating Division:** steel fabrication for construction, aircraft, missile and other industries • expanded fusion weld pipe • reinforced concrete pipe • tanks • For specifications, write: **KAISER STEEL CORPORATION** • **Los Angeles** • **Oakland** • **Seattle** • **Portland** • **Phoenix** • **Denver** • **Tulsa** • **New York**

HOW TO GET ADDITIONAL RECOVERY FROM SMALL VOLUME GAS STREAMS— DRYEX®

The efficient, profitable recovery of raw gasoline from gas streams of 5-50 million cu. ft. per day volume is now provided by "Dryex", a completely automatic skid-mounted adsorption process unit developed by Delta.

The "Dryex" unit affords safe, reliable recovery of 85% of the commercially valuable liquids in such gas streams, at an average operating cost of approximately 15¢ per barrel. "Dryex" may also be used profitably on large, rich gas flows.

For full information regarding "Dryex" and other units in Delta's modern line of oil field equipment and pressure vessels for the chemical, petro-chemical and petroleum industries, *ask the Delta man.*

DELTA TANK MANUFACTURING COMPANY, INC.
BATON ROUGE, LOUISIANA
PLANTS: BATON ROUGE, LA. • MACON, GA. • BEARDSTOWN, ILL.
EXPORT OFFICE: INTERNATIONAL TRADE MART, NEW ORLEANS, LOUISIANA
FABRICATORS OF OIL FIELD EQUIPMENT, MATERIAL HANDLING EQUIPMENT, AND PRESSURE VESSELS.

1

NIAGARA FALLS, N. Y.
50% and 73% Liquid (in tank cars)

6 reasons why Mathieson CAUSTIC SODA is always there

. . . an Olin Mathieson plant is near you.

. . . your source of supply is constantly backed up by five other plants.

For specifications and schedules, call your Olin Mathieson sales representative.

2

SALTVILLE, VA.
50% and 73% Liquid (in tank cars)
76% Solid, Flake, Granular, and Ground (in drum shipments)

3

HUNTSVILLE, ALA.
50% and 73% Liquid (in tank cars)
50% Liquid (in barges)

4

BRUNSWICK, GA.
50% Liquid (in tank cars and barges)

5

McINTOSH, ALA.
50% and 73% Liquid (in tank cars)
50% Liquid (in barges)

6

LAKE CHARLES, LA.
50% and 73% Liquid (in tank cars)
50% Liquid (in barges and tankers)
76% Solid and Flake
(in drum shipments)

MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

INORGANICS: Ammonia • Bicarbonate of Soda • Carbon Dioxide • Caustic Potash • Caustic Soda • Chlorine • Hydrazine and Derivatives • Hypochlorite Products • Muriatic Acid Nitrate of Soda • Nitric Acid • Soda Ash • Sodium Chlorite Products • Sulfate of Alumina • Sulfur (Processed) • Sulfuric Acid

ORGANICS: Ethylene Oxide • Ethylene Glycols • Polyethylene Glycols • Glycol Ether Solvents • Ethylene Dichloride • Dichloroethylether • Formaldehyde • Methanol Sodium Methylate • Hexamine • Ethylene Diamine • Polyamines • Ethanolamines • Trichlorophenol • Surfactants

4920

NOW!

J&L Buttress-Thread Casing

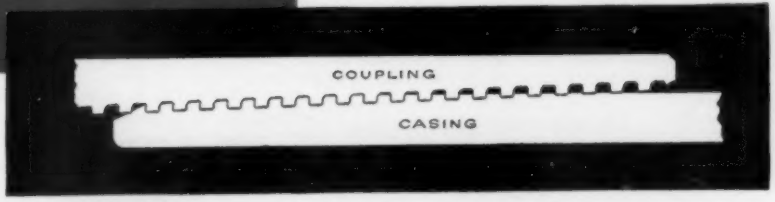
has high strength joint for toughest deep well drilling

High joint strength of J&L Buttress-Thread casing is attained by combined effect of completely engaged runout threads and the three-degree flank angle of the thread. Joint strength is almost equal to that of the body of the pipe.

Easy stabbing, rapid spinning and fewer power strokes to pull the coupling up to the power-tight position are provided by the unique thread design.

A superior casing is assured through use of quality steel, automatically controlled heat treatment, and new precision methods of machining, inspection and testing. Buttress-Thread casing is available in A. P. I. grades J-55, N-80 and P-110 as well as in still higher grades to meet special requirements.

Order this new J&L casing for use in your most severe and variable drilling operations. Write for complete information to the Jones & Laughlin Steel Corporation, Dept. 416, 3 Gateway Center, Pittsburgh 30, Pennsylvania.



Coupling threads (five per inch) engage casing threads throughout the entire length of a long coupling. The ¾ inch taper per foot is continuous and without the conventional fast angle vanishing threads. Full section of the casing is utilized in supporting weight of the string. Inside clearance of joint is not reduced by inside upsets.

J&L STEEL

Jones & Laughlin

. . . a great name in steel

you'll see

CF&I SEAMLESS CASING AND TUBING

all over the Permian Basin...

Rig operators in the Permian Basin know from first-hand experience that CF&I is a desirable source for top-rate seamless oil country casing and tubing. For—ever since it opened its modern tube mill at Pueblo—CF&I has enjoyed the privilege of serving this important production and exploration area.

Oil men all over the West will tell you the same story. CF&I Seamless Casing and Tubing is top quality. CF&I controls every phase of operations required in the manufacture of its seamless casing and tubing—from the mining of its raw materials to the finished product. This step-by-step control assures a product of high quality.

Available in standard sizes from 2⅜" to 9⅝" O.D., CF&I Seamless Oil Country Casing and Tubing meets or exceeds API STD 5A specification. Ask your CF&I representative for the complete story today.

CF&I

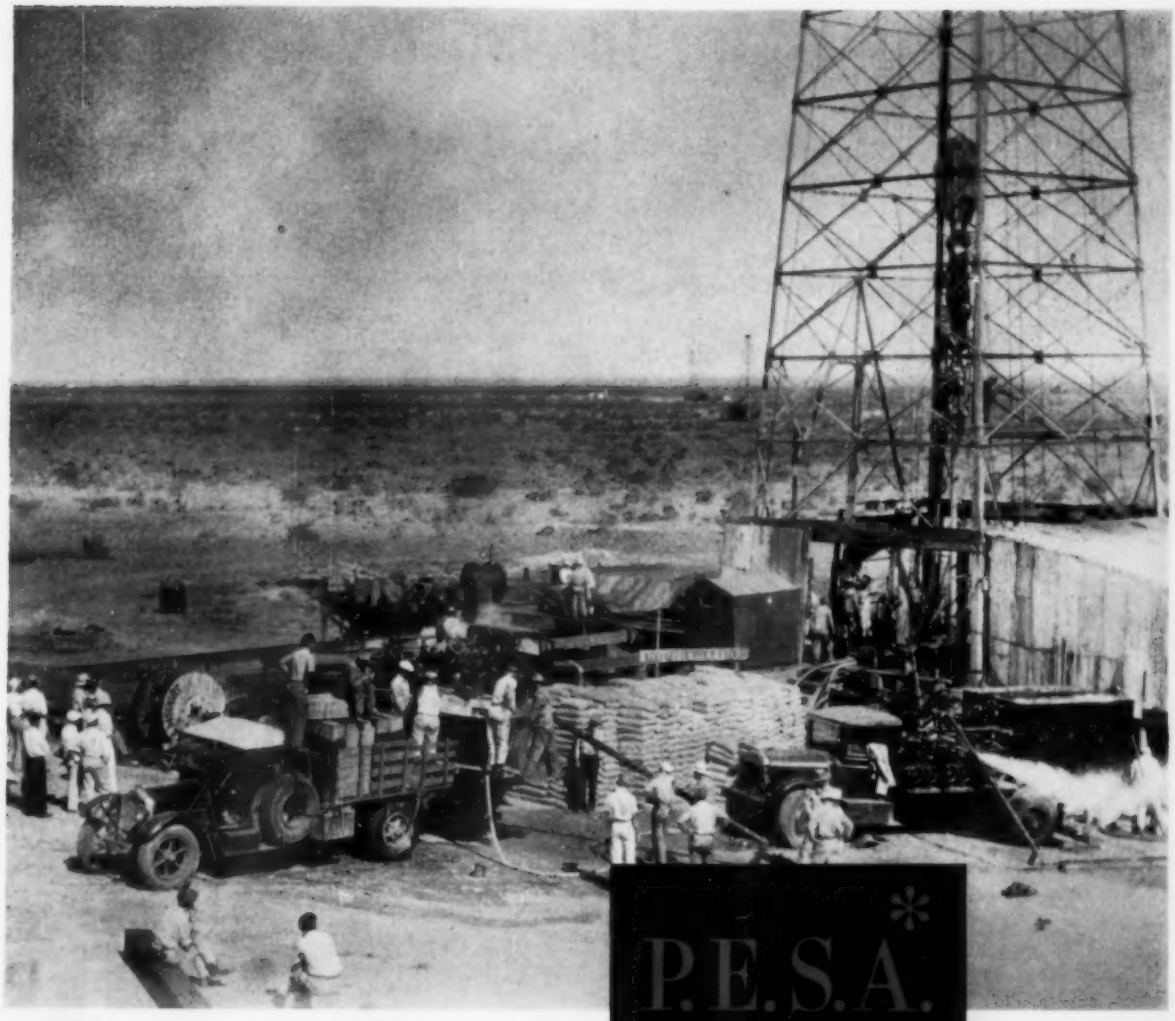
SEAMLESS TUBULAR PRODUCTS

THE COLORADO FUEL AND IRON CORPORATION

Denver, Colorado

4479

Deepest test in the world – 1935 model!



The McElroy Number 103 of Upton County, Texas was started in 1933 and completed in 1935 by a major oil company. It set new records for cost, time to complete, and weight of casing string.

This test was the deepest, (12,786 feet), the most expensive (over $1,000,000) and had the heaviest string of casing (10,301 feet of 7⅝") ever used. It took longer to drill, (over two years) and used more bits (965) than any other well. *Moreover, no important producing formations were discovered.*

This is an excellent example of the kind of BIG pioneering you operators have done. It's a big reason why the oil industry is one of the most progressive in the world.

As a result of this experiment, we—the manufacturers, supply and service companies that now make up PESA—applied the lessons you learned and helped you develop better bits, better mud control practices and stronger tubular goods. Cooperation like this makes the oil industry strong.

*

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

57-100

PROUD TO BE PART OF A PIONEERING INDUSTRY

How neoprene tanks slash costs for Dowell customers

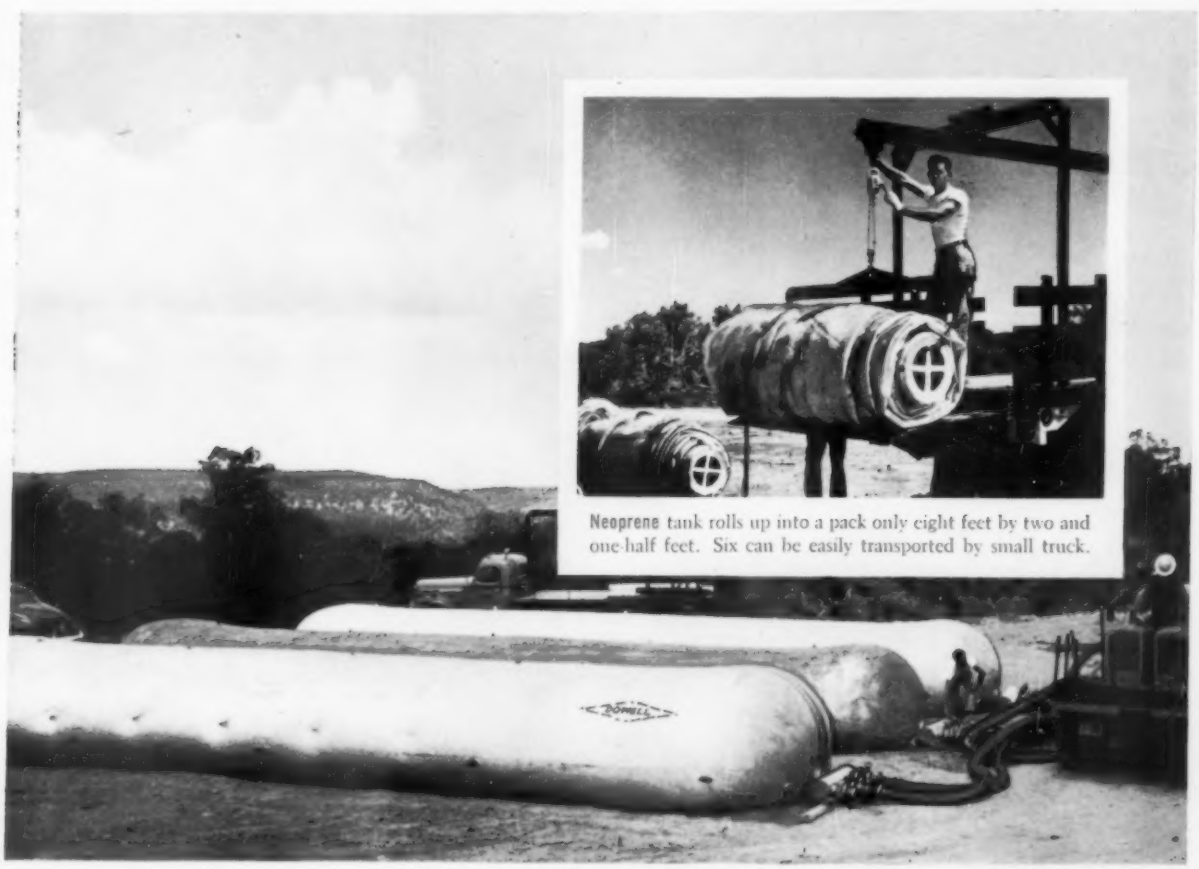
In the rugged San Juan Basin, Dowell, Incorporated, offers its customers collapsible storage tanks* made of nylon fabric, coated inside and out with Du Pont neoprene. By using these synthetic rubber tanks instead of steel tanks on well stimulation treatments, Dowell's customers are cutting transportation, handling and maintenance costs and saving vital time.

Each 15,000-gallon tank rolls up like a sleeping bag. Six can be carried on a small truck, for they weigh only 1350 pounds including fittings. When filled with water, crude or refined oils, they are 47 feet long, 10 feet 8 inches wide and 5 feet 3 inches high. The use of neoprene in these tanks is highly desirable because the rubber lining must resist oil and the cover must resist deterioration by sunlight, abrasion and rough handling.

Oil men around the world have found hundreds of uses for neoprene because of its unique combination of properties. It resists deterioration under the most adverse conditions because it withstands oil and corrosive chemicals, sunlight, heat, cold and aging.

Why not let neoprene save money for you? Next time you're buying piston rubbers, pipe wipers, rotary drilling hose or gaskets, specify NEOPRENE.

*PATENT PENDING



Neoprene tank rolls up into a pack only eight feet by two and one-half feet. Six can be easily transported by small truck.

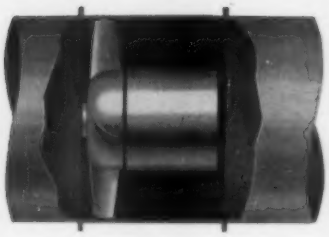
NEOPRENE

MADE BY DU PONT FOR 25 YEARS

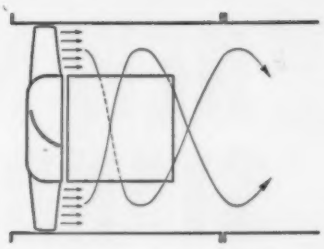
DU PONT

REG. U.S. PAT. OFF.

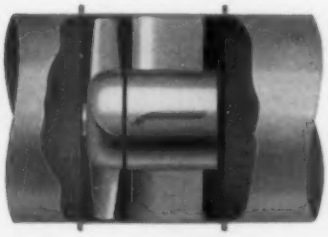
BETTER THINGS FOR BETTER LIVING
...through chemistry



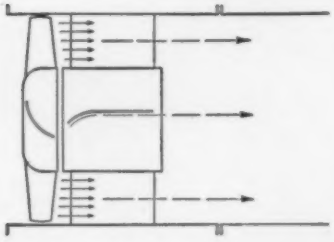
The tubeaxial fan . . . a wide range of volumes at medium pressures, with uniform velocity . . .



. . . at moderate pressures the spiral air discharge straightens out a short distance from fan blades.



The vaneaxial fan . . . stationary guide vanes reduce turbulence and increase fan efficiency . . .



. . . resulting straight-line air flow leaving fan assures smooth, quiet operation for all conditions.

Easy-to-install American Blower axial fans save space, lower your installation cost

Versatile American Blower axial fans can be mounted vertically or horizontally. When ducts are properly reinforced, the fan can be supported directly by the duct connection.

American Blower axial fans provide straight-line air flow, eliminating elbows, bends, and transformation pieces—can be installed vertically or horizontally in ducts, with minimum foundations and supports . . . with savings in space, first cost, handling, and installation.

These compact, self-contained axial fans are available in three general designs—vaneaxial for direct and V-belt drive, spray-booth vaneaxial for V-belt drive, tubeaxial for direct drive. A complete line of accessories is offered to adapt this versatile line of fans to your particular requirements. Capacities range from 2,500 cfm to 75,000 cfm. Larger sizes are available on special order.

For more information on axial fans, or on other equipment from American Blower's complete air-handling and -conditioning line, call our nearest branch office, or write direct to American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of AMERICAN-Standard

GET SQUARE D SAFETY SWITCHES AND BENEFIT FROM THE NEW NEMA STANDARDS

NEMA standards are adopted in the public interest and are designed to eliminate misunderstandings between the manufacturer and the purchaser, as well as to assist the purchaser in selecting and obtaining the proper product for his particular need.

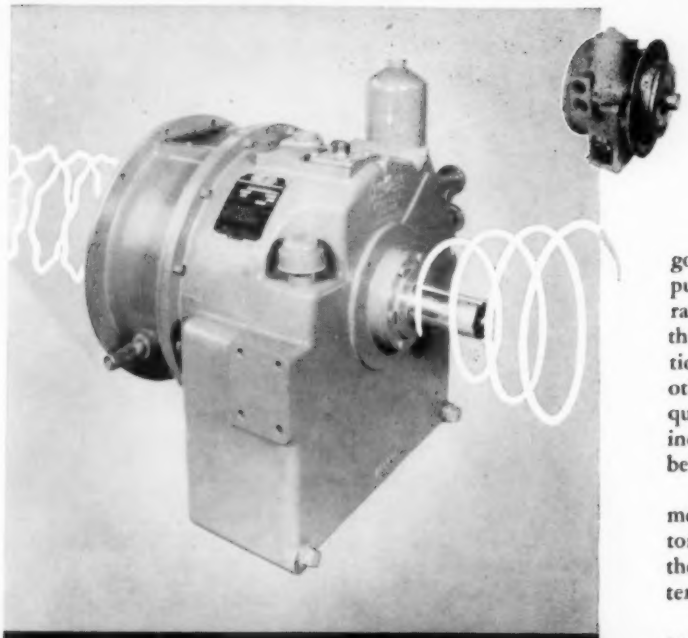
Square D's quick change to the new standards gives you the performance and safety which NEMA standards assure.

Square D Safety Switches cost no more —why settle for less?

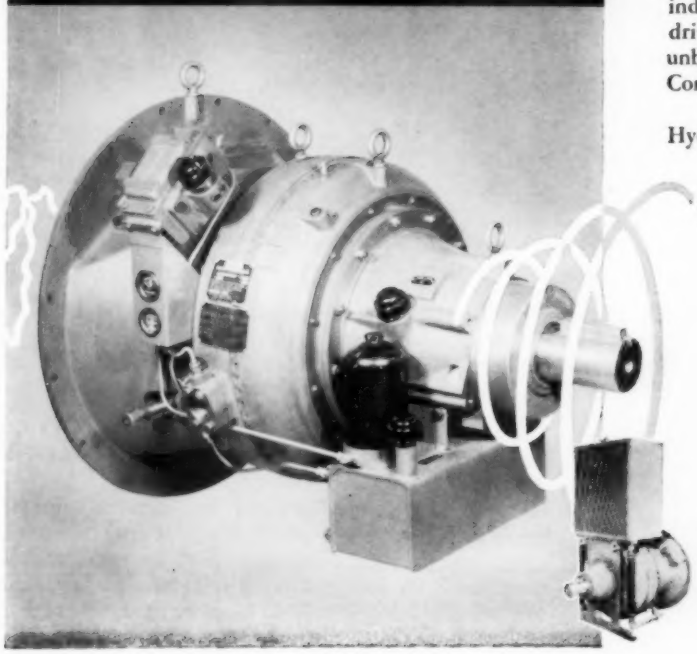
DESCRIPTION	HEAVY DUTY New	NORMAL DUTY formerly Types H, S, or A	LIGHT DUTY formerly Types D or G
Rating-Ampere Voltage	30—600 250 or 600V AC, DC	30—1200 250 or 600V AC, DC	30—200 250V AC
Enclosure	NEMA 12 • Industrial Use (Gasketed) NEMA 4 & 5 • Water-tight & Dust-tight NEMA 7 • Explosion-resisting Class I—Group D NEMA 9 • Explosion-resisting	NEMA 1 • General Purpose NEMA 3R • Raintight	NEMA 1 • General Purpose NEMA 3R • Raintight
Horsepower Rating	NEC Fuse Ratings Dual-Element Fuse Ratings	NEC Fuse Rating Dual-Element Fuse Ratings	NEC Fuse Rating
Operating Mechanism	Quick-Make, Quick-Break Independent of Handle	Quick-Make, Quick-Break Independent of Handle	Positive Make, Positive Break Spring Assisted
Cover	Interlocked & Padlock Attachment	Interlocked & Padlock Attachment	Padlock Attachment
Plating—Current Parts	Extra-Heavy Silver	Silver	
Endurance	Maximum Endurance Far Exceeds UL Standards	Exceeds UL Standards	Meets UL Standards

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE

SQUARE D COMPANY



Single-Stage Torque Converters or Three-Stage Torque Converters?



The answer to the question of "single-stage vs. three-stage" depends largely on the characteristics of the equipment you manufacture or use and the jobs it is required to do. Naturally, many factors must be known before any engineering department can be expected to make recommendations.

Generally speaking, however, when it is desired to have minimum pulldown from governed engine speed—with maximum power output over a wide range—and to produce high torque ratios for hoisting or heavily loaded vehicles, a three-stage torque converter, with torque multiplication up to six times, may be most desirable. On the other hand, where mild torque conversion is required, as in certain types of vehicles and in other industrial equipment—a single-stage converter may be the best choice.

Now you can benefit from the unbiased recommendations of one manufacturer in choosing a torque converter—single-stage or three-stage—with the exact capacity and torque transmission characteristics to give your equipment maximum efficiency.

Twin Disc Clutch Company's line of single-stage torque converters—available as the 1300 and 1500 Series units—complements its time-tested, universally accepted line of five series of three-stage units. Single-stage *or* three-stage—from 30 to 1000 hp—you can depend on Twin Disc Torque Converters to give your equipment better performance . . . less downtime . . . and greater earning potential.

In addition to offering the most complete, the most versatile line of industrial torque converters available, Twin Disc manufactures fluid couplings in a wide range of sizes for engines and motors from ¾ to 850 hp, and friction clutches for applications from fractional to 1050 hp.

For smooth, dependable transmission of power to your equipment and machinery, standardize on Twin Disc—the world's leading manufacturer of industrial fluid and friction drives. Whatever your drive problem, you can count on Twin Disc for unbiased recommendations . . . for Twin Disc Clutch Company makes them all.

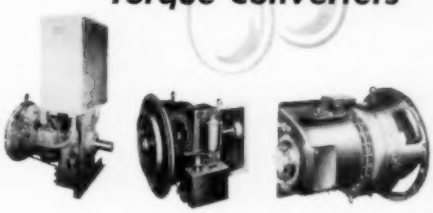
Twin Disc Clutch Company, Racine, Wisconsin; Hydraulic Division, Rockford, Illinois.

TWIN DISC MAKES THEM ALL

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

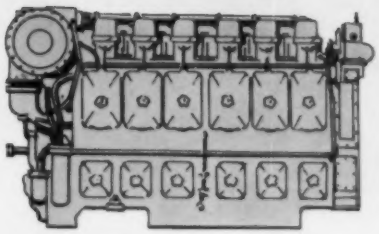
TWIN DISC

Torque Converters

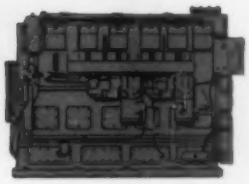


FOR ELECTRIFIED
OIL WELL DRILLING . . .

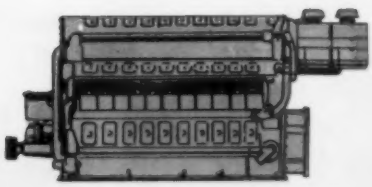
Use the Oil Field Engine You Know Best with General Electric Drive and Get More Efficient Drilling Power



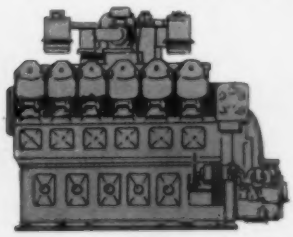
ALCO



CLIMAX



FAIRBANKS, MORSE & CO.



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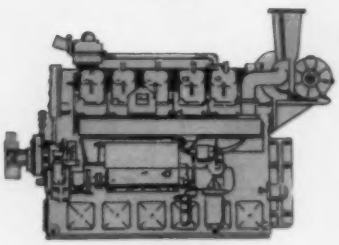
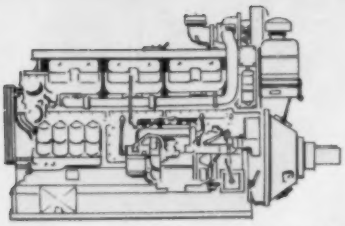


WAUKESHA

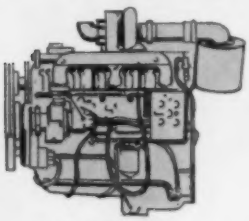
CAN BE USED WITH VIRTUALLY ANY POPULAR OIL FIELD ENGINE
Your preference for and your familiarity with a particular make of engine need not be sacrificed to gain the benefits of General Electric drive and you may be able to use spare engines which you have in stock. Parts programs need not be complicated by the addition of a different line. General Electric and the engine builder cooperate to furnish a completely coordinated system of specialized equipment suited to your drilling needs.

AVAILABLE FOR A WIDE RANGE OF APPLICATIONS
General Electric drive is available in many sizes through a wide range of applications for offshore rigs, skid and trailer-mounted land rigs, for shallow and deep well drilling . . . literally for any drilling application, and for all normal drilling functions.

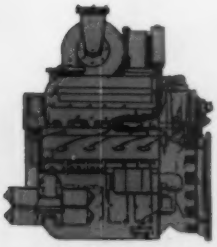
DESIGNED-IN CONTROL SIMPLICITY ELIMINATES COMPLICATED EXTERNAL APPARATUS, FEED BACK SYSTEMS, AND TORQUE LIMITING DEVICES
General Electric's differential generators eliminate the need for current and voltage regulating controls and other complicated apparatus used in some makes of electric drive. General Electric's familiar air throttle system eliminates the individual exciters for each generator, and G-E shunt motors will not run away in case



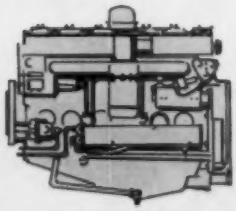
CATERPILLAR TRACTOR CO.®



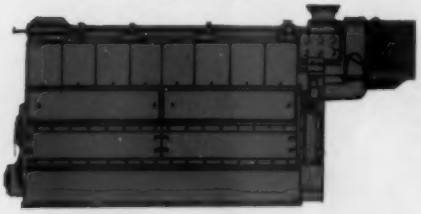
CUMMINS



HERCULES

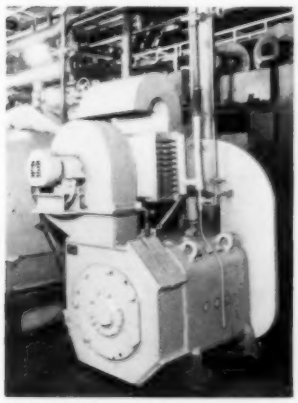


MURPHY DIESEL



WHITE-SUPERIOR

LOUISIANA DELTA OFFSHORE CORP. RIG DELTA NO. 1 equipped with ALCO engines and General Electric drive. Operating as drilling contractor for oil producers, the rig is located forty miles out in the Gulf of Mexico off the Louisiana Coast from New Orleans. LEFT . . . Some of the popular oil field engines with which General Electric drive can be mounted.



TYPE GE752H DRILLING MOTOR with a closed cooling system being used for mud pump drive on Delta No. 1.

OPERATOR AT DRILLERS' CONTROL CONSOLE focusing his attention on the drilling operation on Delta No. 1.

of load loss and therefore require no speed-limiting control devices.

BUILT BY THE ORIGINAL MANUFACTURER OF ELECTRIC DRIVE

General Electric is primarily an electrical equipment manufacturer with years of experience in the manufacture of electrical apparatus. The simplicity and flexibility which mark General Electric drive are the result of leadership in the electrical field.

For more information, call your nearest G-E Apparatus Sales Office. (Principal drilling offices in Dallas, Houston, New Orleans, Denver, Tulsa and Los Angeles.) Locomotive and Car Equipment Department, Erie, Pa.

115-21

Progress Is Our Most Important Product

GENERAL ELECTRIC

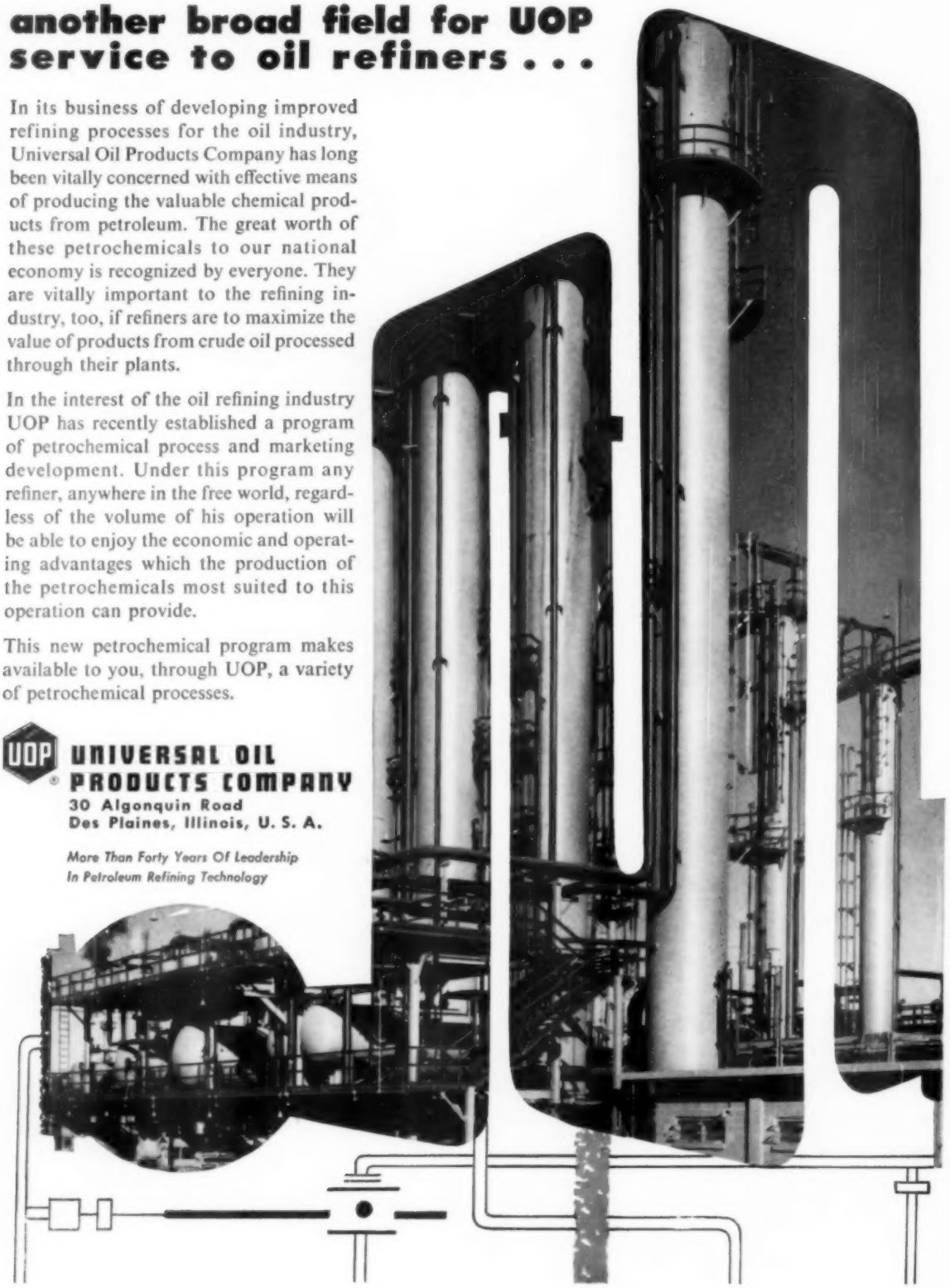
PETROCHEMICALS

another broad field for UOP service to oil refiners . . .

In its business of developing improved refining processes for the oil industry, Universal Oil Products Company has long been vitally concerned with effective means of producing the valuable chemical products from petroleum. The great worth of these petrochemicals to our national economy is recognized by everyone. They are vitally important to the refining industry, too, if refiners are to maximize the value of products from crude oil processed through their plants.

In the interest of the oil refining industry UOP has recently established a program of petrochemical process and marketing development. Under this program any refiner, anywhere in the free world, regardless of the volume of his operation will be able to enjoy the economic and operating advantages which the production of the petrochemicals most suited to this operation can provide.

This new petrochemical program makes available to you, through UOP, a variety of petrochemical processes.



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Simply picking up the tubing releases the setting mechanism and the packer may be reset or pulled. *No rotation is required to unseat packer.*

Completely Drillable

The entire packer, except the stem, is completely drillable in cases of extreme emergency.

Holds High Differentials

The split cups effect a dual seal with the casing and tubing mandrel to provide tremendous resistance to high differential pressures.

For information on all Brown Packers, including parallel string completions, contact nearest representative or write to Brown Oil Tools, 8490 Katy Road, Houston.

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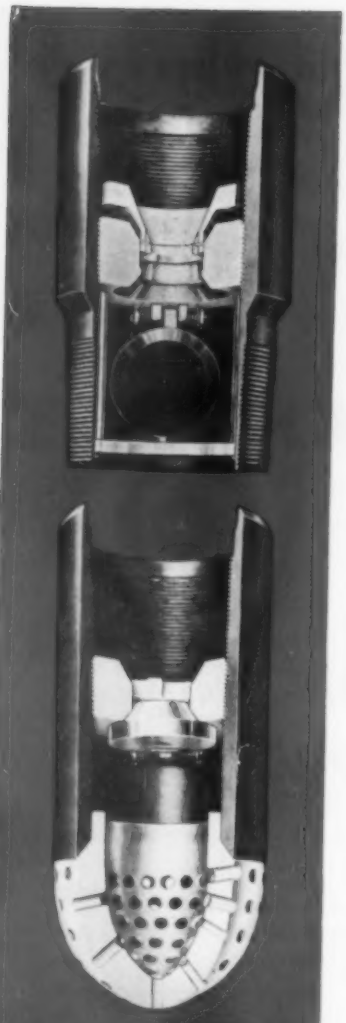

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...when you run casing with

RECTOR TYPE "O"

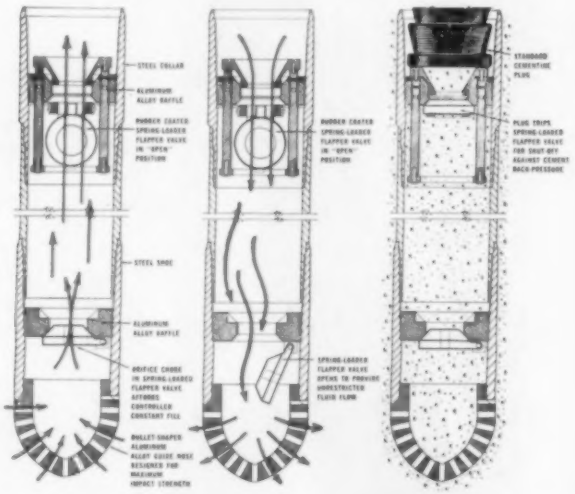
Optional Circulating FILL SHOE and COLLAR

Rector Type "O" is the ONLY automatic casing fill-up equipment that permits circulating the well at your option, and then continuing to run pipe with controlled fill from the bottom. In cementing the well you use standard heads and plugs. The Type "O" collar provides positive shut-off against back-pressure.

If you need to convert from filling to floating, you can do so quickly by dropping in valve-trip ball at the surface and applying pump pressure.

Type "O" Fill Collars and Fill Shoes, used in combination, are priced competitively with other types of fill-up equipment which do not offer the Rector advantages of optional circulating, protective screening nose, and FULLY DRILLABLE ALUMINUM ALLOY all-metal construction. Prompt delivery through your favorite supply store in O.D. casing sizes from 4½" to 13⅜".

- Controlled casing fill from the bottom with option of circulating and then resume filling.
- Automatic fill-up speeds running time... reduces pressure surges ... protects the formation.
- Spring-loaded flapper valve, with orifice choke, in the baffle assures controlled constant fill.
- Reduces possibility of pipe sticking.
- Converts to float at operator's option.
- Screening nose protects fill equipment from fouling.



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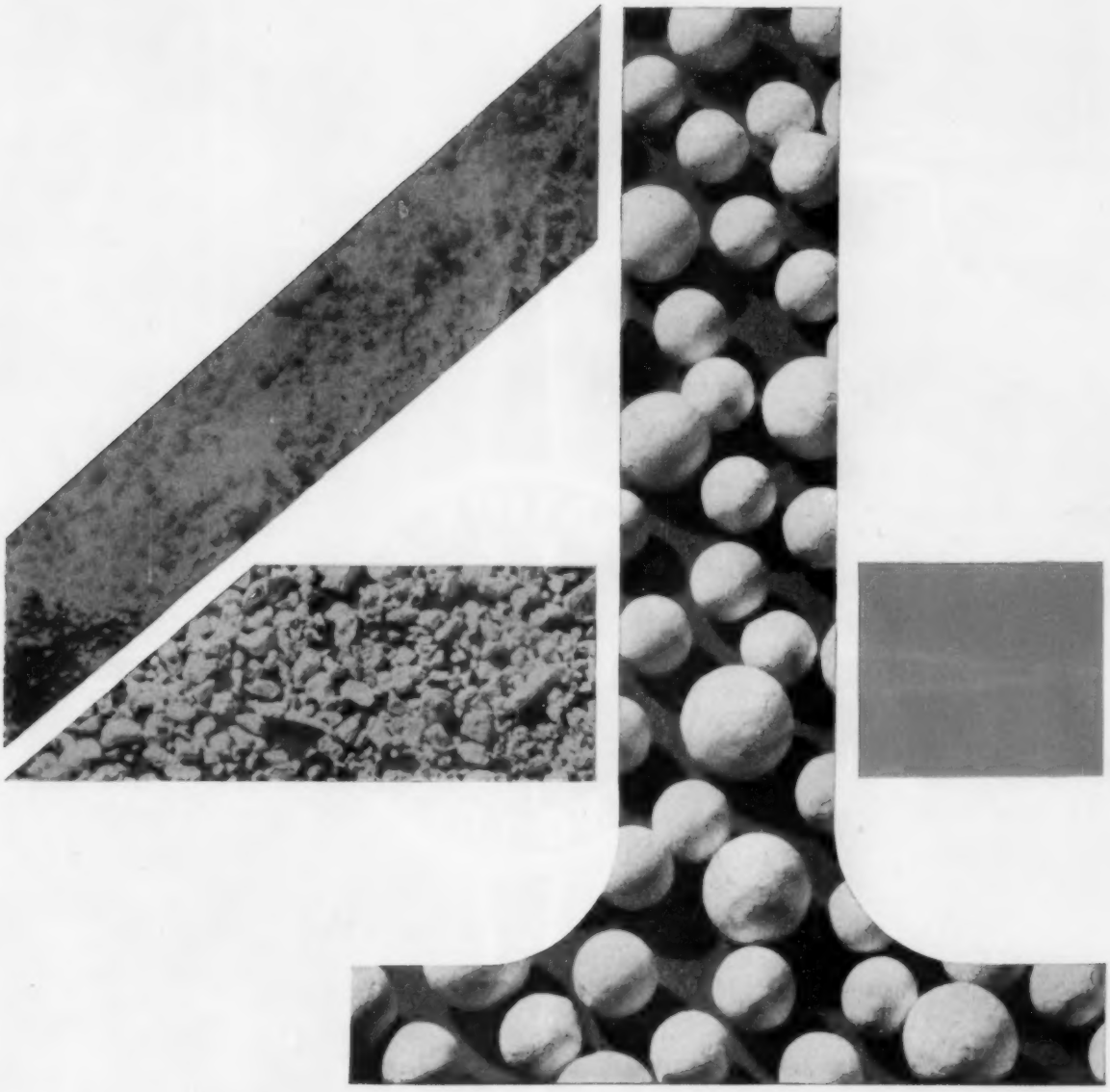

good reasons to rely on ALCOA ALUMINAS

Need top performance catalysts or catalyst supports . . . long-life refractory ingredients . . . performance-proved desiccants . . . binders, fillers and pigments for product formulations . . . or raw materials for a host of other uses? Here are four excellent reasons to rely on ALCOA® Aluminas for your chemical material needs . . . *STABLE PRICES:* increasing tonnage sales plus continuing improvements in efficiency and equipment have kept prices of Alcoa Aluminas low and uniform for over 20 years—a record nearly unparalleled in heavy chemicals! . . . *UNIFORM QUALITY:* painstaking attention to quality assures uniform chemical and physical characteristics for every type and grade of ALCOA Aluminas—carload after carload after carload! . . . *ABUNDANT SUPPLIES:* produced in vast amounts, primarily for the aluminum industry, ALCOA Aluminas are available to you in almost unlimited quantities. You can always count on *DEPENDABLE DELIVERY* of the full quantity you need, *when* you need it.

Don't suffer from raw chemical price fluctuations, impurities, supply deficiencies or delivery failures! Put dependable ALCOA Aluminas to work in *your* plant to eliminate those handicaps. Write today for complete information. ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 715-H Alcoa Building, Pittsburgh 19, Pennsylvania.

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30 years in drill stem testing . . . **Service**
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30 years in developing personnel . . . **Drill Stem Testing Specialists**

Yes, Johnston has spent 30 years as the recognized leader in drill stem testing. And we're proud of it!

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A Subsidiary of Schlumberger Well Surveying Corporation

first in drill stem testing
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Applying NO-OX-ID Coating and Wrapper by Traveliner.

Mill- or yard-wrapping for long-term protection at its best.

Hand application of NO-OX-ID Cold Coating.

NO-OX-ID "C-M" Casing Filler protects casing and carrier pipe under highways and railroads.

NO-OX-ID coating-wrapper combinations are the versatile answer to every kind of pipeline protection

Whether you are installing distribution or transmission lines—whether you are working over rough or smooth terrain, there is a NO-OX-ID Coating and Wrapper Combination to give the right protection.

On mill-wrapped pipe, NO-OX-ID Coating, Wrapper and Service Coat protect from mill to ditch. NO-OX-ID can be applied over the ditch by Traveliner using less material and equipment. Hand-applied on short line installations, service lines or special fittings, NO-OX-ID goes on fast. No noxious fumes.

Leading pipeline contractors and utilities rely on versatile NO-OX-ID Coating and Wrapper Combinations. Consult with your Dearborn Pipeline Engineer. He will help you select the right combination for your next pipeline job.

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Protecting Metal Against Corrosion for 70 Years

LOW DOWN . . . The low, sleek lines of the modern American automobile are made possible by an ingenious engineering achievement called the hypoid gear. It drives the rear wheels, but because it meshes *below* their centers, engineers are able to reduce an automobile's height. Lubricating the hypoid gear posed a tough, complex problem . . . a problem eventually solved by the combined research skill of the automobile and petroleum industries. Texaco scientists pioneered in developing a rugged petroleum lubricant for this special purpose . . . another evidence of the cooperation and resourcefulness that has made Texaco research a valuable partner of modern industry in its march of progress.

TEXACO ***progress . . . at your service***

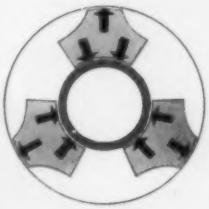
THE TEXAS COMPANY

DEPENDABLE - DURABLE - PORTABLE

Guiberson's Type H Tubing Spider

for medium and shallow wells

Optional plain gate



Slips make 3-point contact with bowl and tubing — give a smooth, tight grip without crushing the tubing or sticking in the bowl.

Here's a tubing spider so easy to operate you can release it with a single hand or foot, leaving hands free for other work — designed so one man can carry it — yet so rugged and husky it does a job on medium or shallow wells.

Perfectly balanced slips, with segment-insert teeth, make running tubing almost a pleasure with the Type H. Teeth prevent rotation of tubing either way — no need for back-ups. The Type H spider is equipped with a guard gate to prevent damage to slips by elevator. Plain gate, still lighter in weight, is optional at same price.

Crews tell us that they like the Type H tubing spider's new light weight — like its smooth, fast operation — like its segment teeth. The full set of 12 segments is replaceable on the job, at about the same cost as resharpening conventional slips. And speaking of price, there's a lot more value in this spider than its low cost would suggest!

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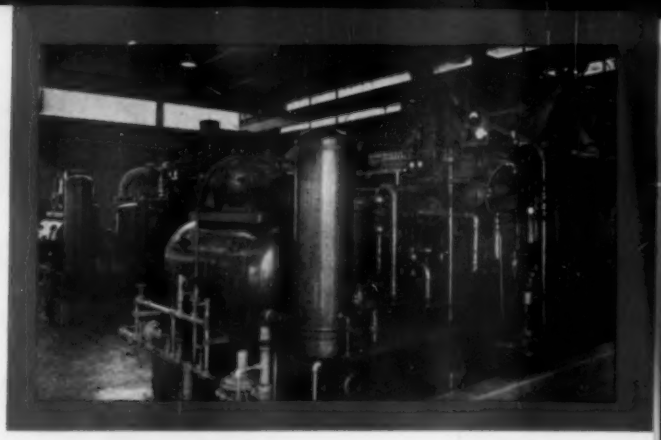
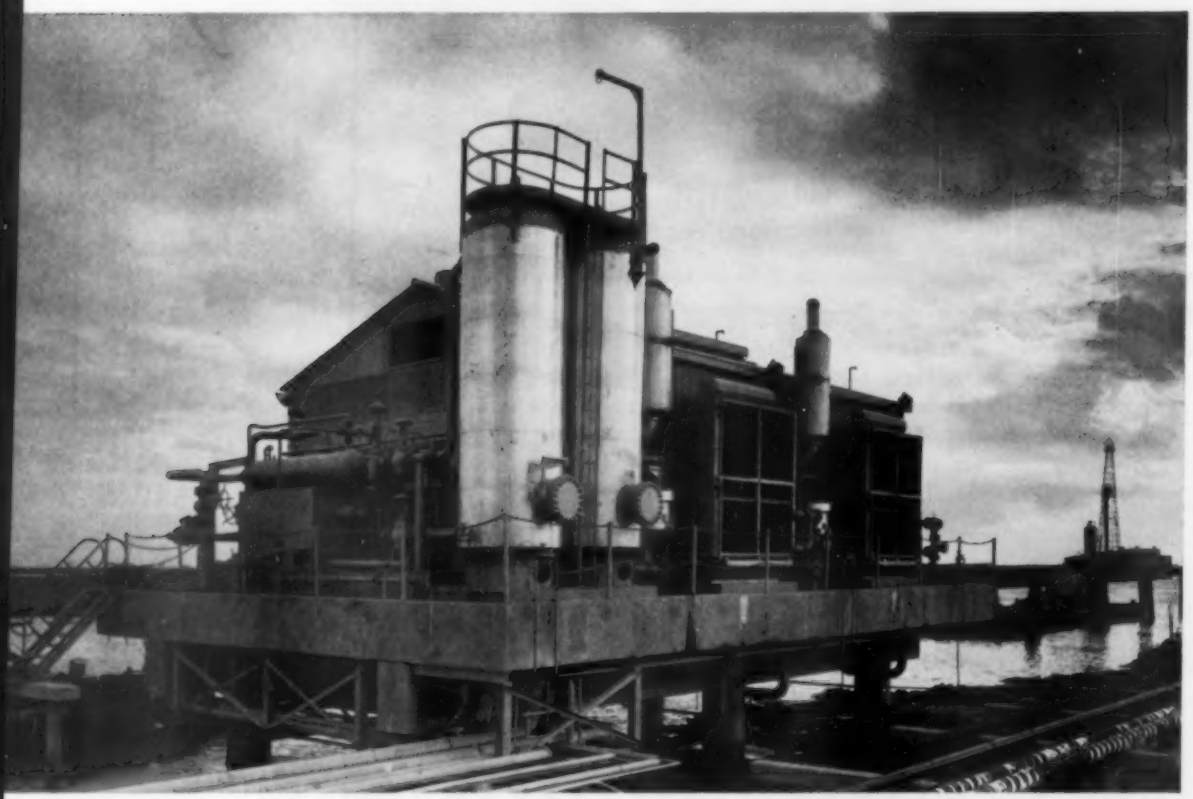


Southwest

PERFECT BALANCE FOR VIBRATION-FREE OPERATION

The perfect balance of these two Cooper-Bessemer GMXD-8 compressors and their packaged components allows them to compress 19 million cubic feet per day from 350 to 900 psi—vibration-free. Southwest Packaged Gas Compressors can be installed in any location to do any compressing job. They can be mounted on piling, pre-stressed concrete platforms, barges or wherever necessary for most economical installation and operation.

The unattended operation, possible with the automatic controls and safety devices on Southwest Packaged Compressor Plants, cuts operating costs per horsepower-hour to a fraction of the cost of a fully attended stationary installation. A Southwest engineer can show you actual comparative operating costs. Available in sizes from 265 h.p. to 660 h.p.



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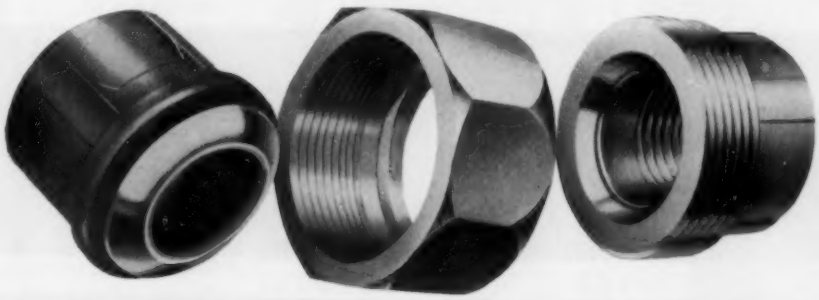
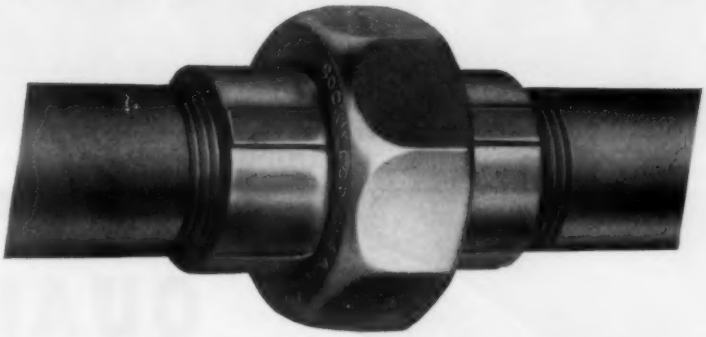


Because the male seat
is 150 Brinell harder than .....the female seat.....



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They Say—

The point of the import plan

"A vagrant thought that ran across the typewriter keys and ended up in an editorial in the Wall Street Journal the other day has got that publication in a hot argument with the domestic oil industry. It suggested that 'our hidden oil reserves' might better be left alone because 'the untapped oil is not going to run away' while we import more of our requirements.

"This was a broadside target . . . and the oil men have been wheeling up their big guns and puncturing it daily. Who, they asked, would sink the money in exploration to spot the reserves and then wait indefinitely for a return on their investment? Did the independent Journal mean for the Government to subsidize the oil industry?

"The Journal's writer needs no particular defense from another editorialist. We think we know what has conditioned his mind. Pragmatic editorial writers have ceased to think about any phase of the business in the old-fashioned terms of supply and demand. Everything is managed by the Government in one way or another . . . The Journal author simply thought Uncle Sam had a formula for warehousing oil in the ground, too, and that this way might be best.

"He was right about the Government having a plan; he simply picked the wrong one.

"The right one is the scientific limitation of imports, not necessarily to keep the stay-at-home oil producers in business at a profit while their better-financed brethren drill for oil abroad and find it in great virgin lakes—but to keep them at work against the day when we might need them desperately."

An editorial in the Tulsa Tribune.

Anderson takes over Treasury

"I take on the duties of Secretary of the Treasury with humility for I am aware not only of the great honor of the office and the tremendous responsibility involved, but of the challenge I face in succeeding such an able and outstanding man as George Humphrey.

"The most I can do is pledge that I will do my utmost to serve as Secretary of the Treasury in the continued best interest of all the people. It would be conjectural for me to try to say precisely what I will or will not do, or exactly how I will try to meet sit-

Prevent electrostatic spark explosions . . .

PLAY IT SAFE . . . USE NELSON EXPLOSION-PROOF ELECTROSTATIC DRAIN AND GROUND INDICATORS

- ON GASOLINE TRUCK LOADING RACKS
- IN TANK CAR LOADING & UNLOADING OPERATIONS
- IN TANKER LOADING & UNLOADING OPERATIONS
- IN HANDLING EXPLOSIVE & FLAMMABLE MATERIALS

Close-up view of visual indicator and the explosion-proof enclosure which houses the device's equipment.

Photo shows grounding device cable clamped on truck being loaded.

The Nelson Class 490, Model C. Explosion-Proof Electrostatic Drain and Ground Indicator definitely indicates the quality of a ground connection at those locations where an electrostatic spark could cause an explosion. It also provides a means for draining any electrostatic charge which may have accumulated.

The unit may be used to activate an audible or visual alarm, and/or may be connected to make pump start-up impossible until proper grounding has been accomplished.

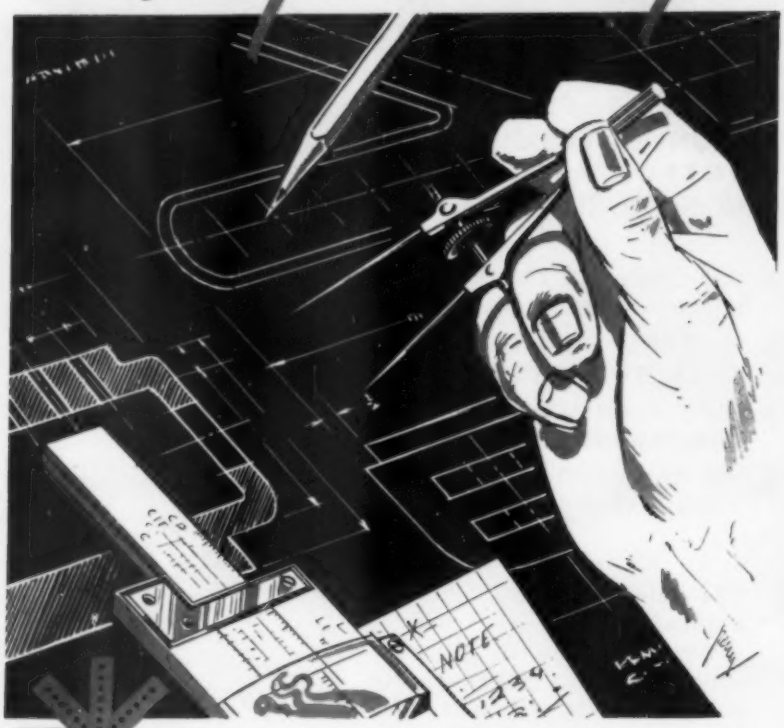
For complete information contact the factory or write for Bulletin 490.

Nelson Electrostatic Drain and Ground Indicator installed in Gasoline Bulk Plant.

- A MAJOR SOURCE OF ELECTRICAL CONTROL EQUIPMENT FOR INDUSTRY.

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA

WE SELL BURNER *Engineering*



John Zink engineering is the answer to your burner problems. In thousands of installations John Zink gas, oil and combination burners have proved their merits by years of satisfactory service.

John Zink engineering has been the answer to countless special problems, such as:

- Famous JZ Smokeless Field Flares . . . in use wherever smoke or smog is a problem.
- JZ Sludge Burners . . . an answer to waste disposal for chemical plants.
- JZ Inert Gas Generators . . . for increased safety in process plant operations.
- JZ Ultra-High Temperature Air Heaters . . . for research programs.

WE MAKE HEAT . . . AROUND THE WORLD

Throughout the world John Zink engineering is working for the petrochemical industry. Why not put it to work for you? Inquiries on burners for special application are always welcome . . . and the John Zink research furnace provides excellent testing facilities for new designs.

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JOHN ZINK COMPANY

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uations which may arise. This will depend on what will best contribute to the general welfare of our country and our economy in light of circumstances prevailing at any given time."

Statement of new Secretary of the Treasury Robert B. Anderson.

A lesson on competition

"Your conception of competition that one seller always has to have lower prices than another is simply not a practical, acceptable definition of competition in any business I know of in the United States.

"It is a concept of some people not familiar with business; it is an impractical way of running a long-range competitive business. In the steel industry we know that is so.

"I think you (Sen. Estes Kefauver) understand the word (competition), but I don't think you understand the concept . . .

"For anyone to assume prices aren't competitive simply because one company raises the price when another one does is simply an erroneous assumption."

Roger Blough, chairman of U. S. Steel Corp., in testimony before a Senate judiciary subcommittee headed by Sen. Kefauver.

Canadian gas may cost more

"Present indications are that increased costs of materials, equipment, labor, and money are going to make it essential for our companies to apply for rate increases in 1958 or 1959. Even with such an increase our rates should still be low compared to those charged elsewhere . . .

"An expenditure of capital directly attributable to Western Canada natural gas, within the next 5 to 7 years, of 2-billion dollars is reasonable."

Dennis K. Yorath, president, Northwestern Utilities, Ltd., and Canadian Western Natural Gas, Ltd., in a speech to the Canadian Gas Association.

Borrowers may be out of luck

"Because of the oil and gas industry's chronic demands for credit, it might be useful to review the credit situation which currently is described as 'tight money.' . . .

"The substantial capital expansion program of business in particular probably is the most unique characteristic of the present boom, as well as one of the primary causes for the exceptional demand for bank funds. The volume of credit required to finance this investment has been in excess of the supply of business and individual savings. As a result, some of the credit

Your stock in J&L KNOW-HOW

It was no novelty for the muddy main street in an early supply center to bog down a mule team and wagon. We were doing business in those days ourselves.

Many years later difficulties still arise, but thanks to modern facilities and seasoned know-how, J&L customers suffer few inconveniences.

Our radio communication system in West Texas is a typical example of continuing efforts to abolish time and distance for J&L customers. The system not only expedites routine service, but copes successfully with emergencies insurmountable in the legendary days of the mule team.

Every man in the petroleum industry has an equity in J&L know-how, and to J&L customers from the Gulf of Mexico to the last outpost in Canada it pays dividends at every turn.

PICTURES, TOP TO BOTTOM: Burning discovery well, Corsicana; Seminole boom days; early Burkburnett; waiting their turn for supplies at Smackover.

49

Jones & Laughlin

SUPPLY DIVISION – Tulsa

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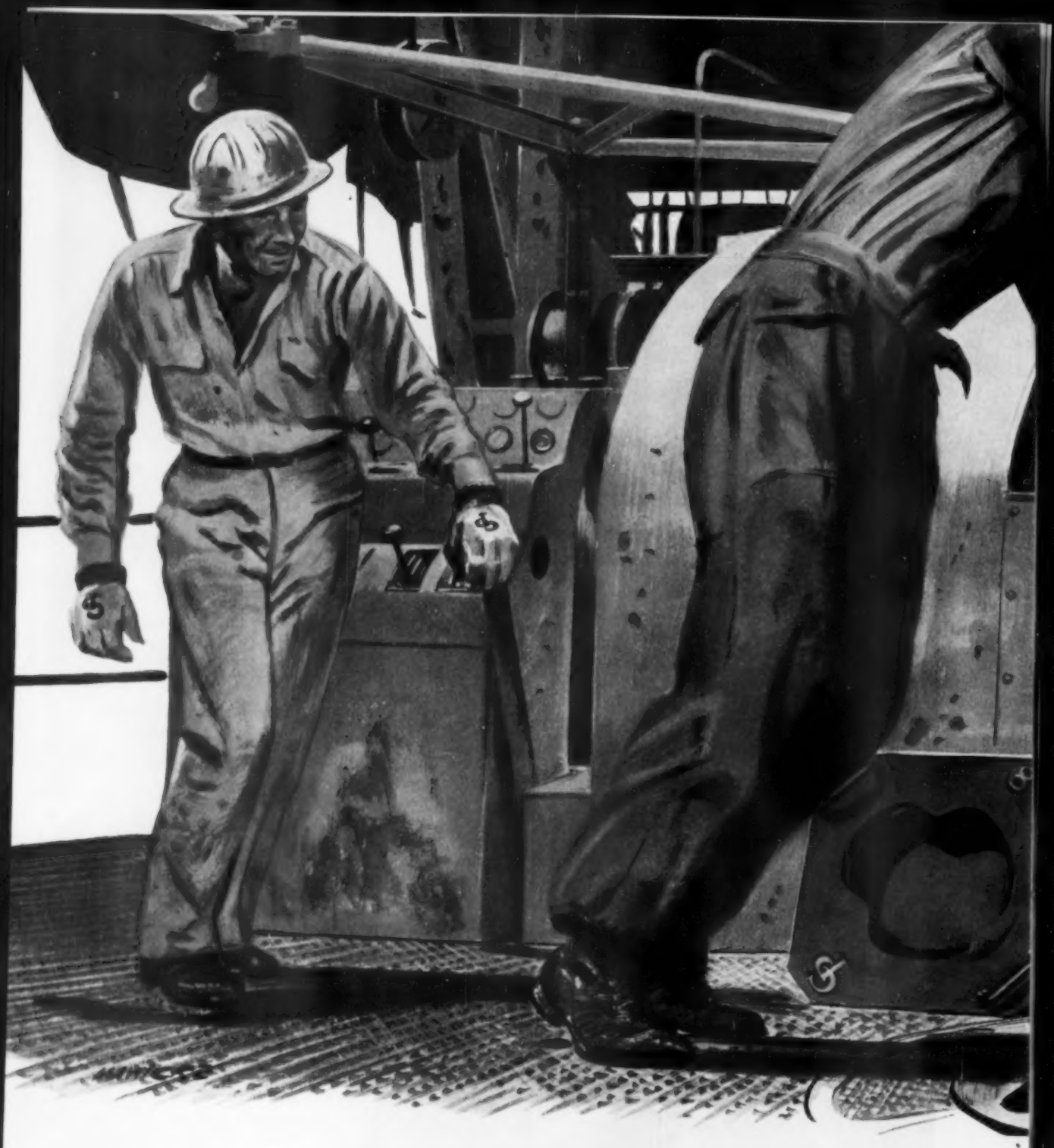

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OIL TOOL DIVISION: Fort Worth, Texas

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If you have troublesome wells on your lease . . . wells that are hard to keep pumps in due to corrosive or abrasive fluids . . . and if the cause of your pump trouble is in the valves . . . the next time you're in your supply store ask them to show you a set of DuMore® Balls and Seats.

DuMore is a super-hard alloy composition that affords the highest resistance to wear caused by sand cutting, corrosion, or ball pounding. DuMore Balls and Seats are non-magnetic, they are corrosion-proof, and they run especially well in sour or sweet crudes, hydrogen sulphide gas, or salt water brine.

Considering its unusual metallurgical properties (an alloy of chromium, cobalt, and tungsten), it's a bargain at any price . . . yet DuMore costs less than premium grade ball valves. Moreover, the expenses you would eliminate in one pulling job alone would more than pay for fitting out your pump with DuMore Balls and Seats.

Try DuMore the next time you run a pump. You will be more than satisfied with the service they will give you, and you will agree that it's the "Best Ball and Seat in the Oil Patch."

DuMore® Balls and Seats

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"Best Balls and Seats in the Oil Patch"

demands normally filled by other sources of investment funds have spilled over into the commercial banks . . .

"When a growing number of borrowers clamor for funds at the same time, the demand tends to exceed the supply, and money becomes scarce, with a rise in interest rates the inevitable result.

"When confronted with credit demands in excess of their resources, banks have had to exercise an increasing degree of judgment in extending credit. Some individuals and corporations have found it increasingly difficult to borrow as much money as they would like, and those who successfully obtain credit find that they must pay a higher price for it."

Glenn M. Forgan, vice president, First National Bank of Chicago, in a speech at the Texas Independent Producers and Royalty Owners Association convention.

Last-half demand to rise

"We believe that in the second half, total demand will rise nearly 5 per cent above a year earlier. Exports may be as much as 35 per cent below the unusual 1956 period, but domestic consumption is expected to rise some 7.4 per cent.

"Gasoline requirements are expected to increase nearly 5.4 per cent. The most significant gain, however, will be in consumption of distillate fuels, which may rise more than 10 per cent if normal temperatures prevail.

"Though demand prospects appear favorable, the resumption of more usual patterns of world oil flows has left the oil industry with some problems of supply readjustment which must be solved in the ensuing months.

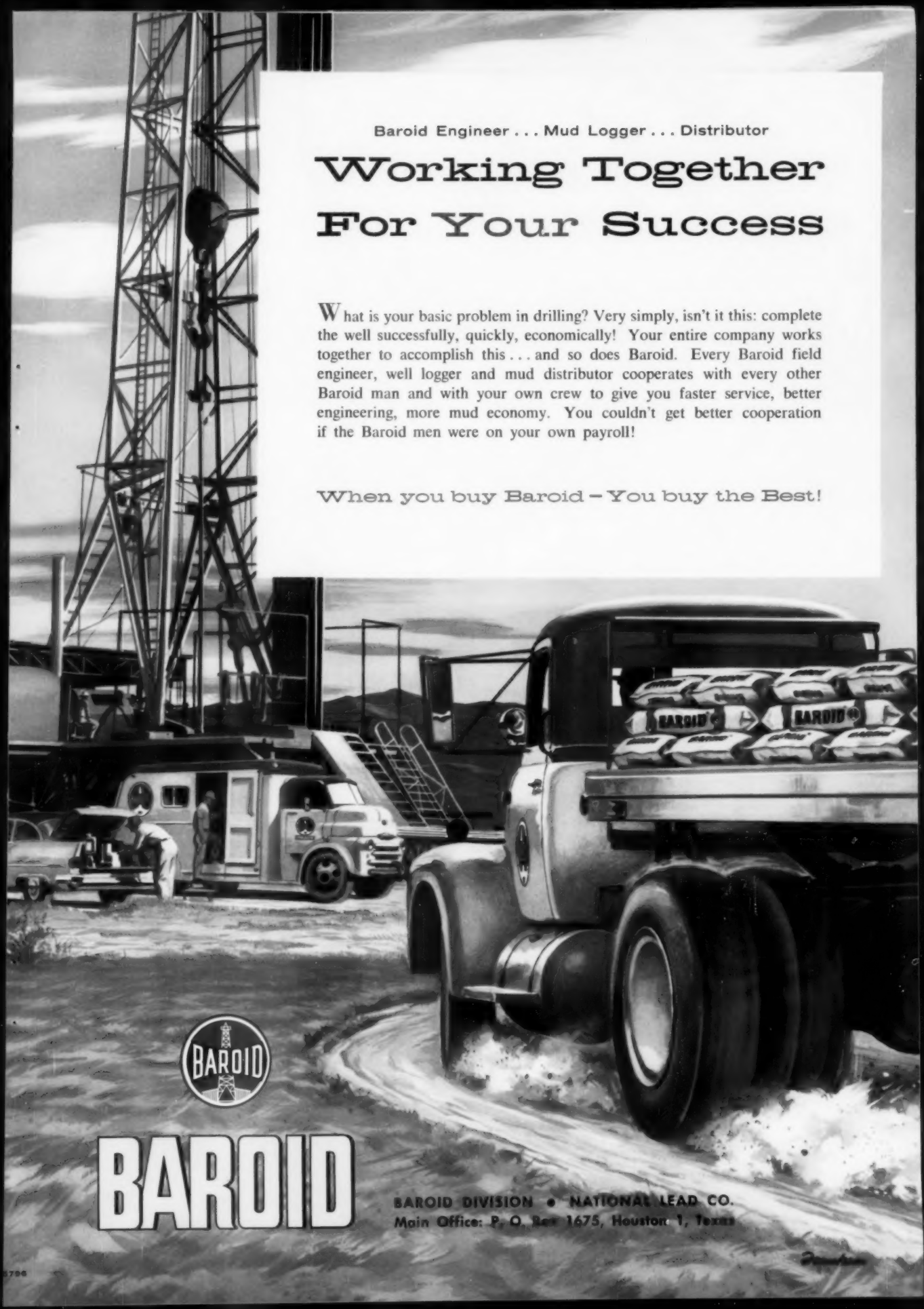
"Product inventories, generally, are somewhat above economic levels; lower refining rates reported in recent weeks, if maintained, should do much to correct these inventory positions. On the other hand, crude-oil stocks, which had been down to near minimum levels by the end of the Suez emergency have been rising rapidly."

Henderson Supplee, Jr., president, Atlantic Refining Co., in the July-August issue of The Atlantic Magazine, company publication.

"Unworkable" imports plan

"It is our present feeling that a voluntary program such as this (the Government's imports plan) will be unworkable and points to the need for legislation in this matter."

Oklahoma Independent Petroleum Association, in a letter to its membership.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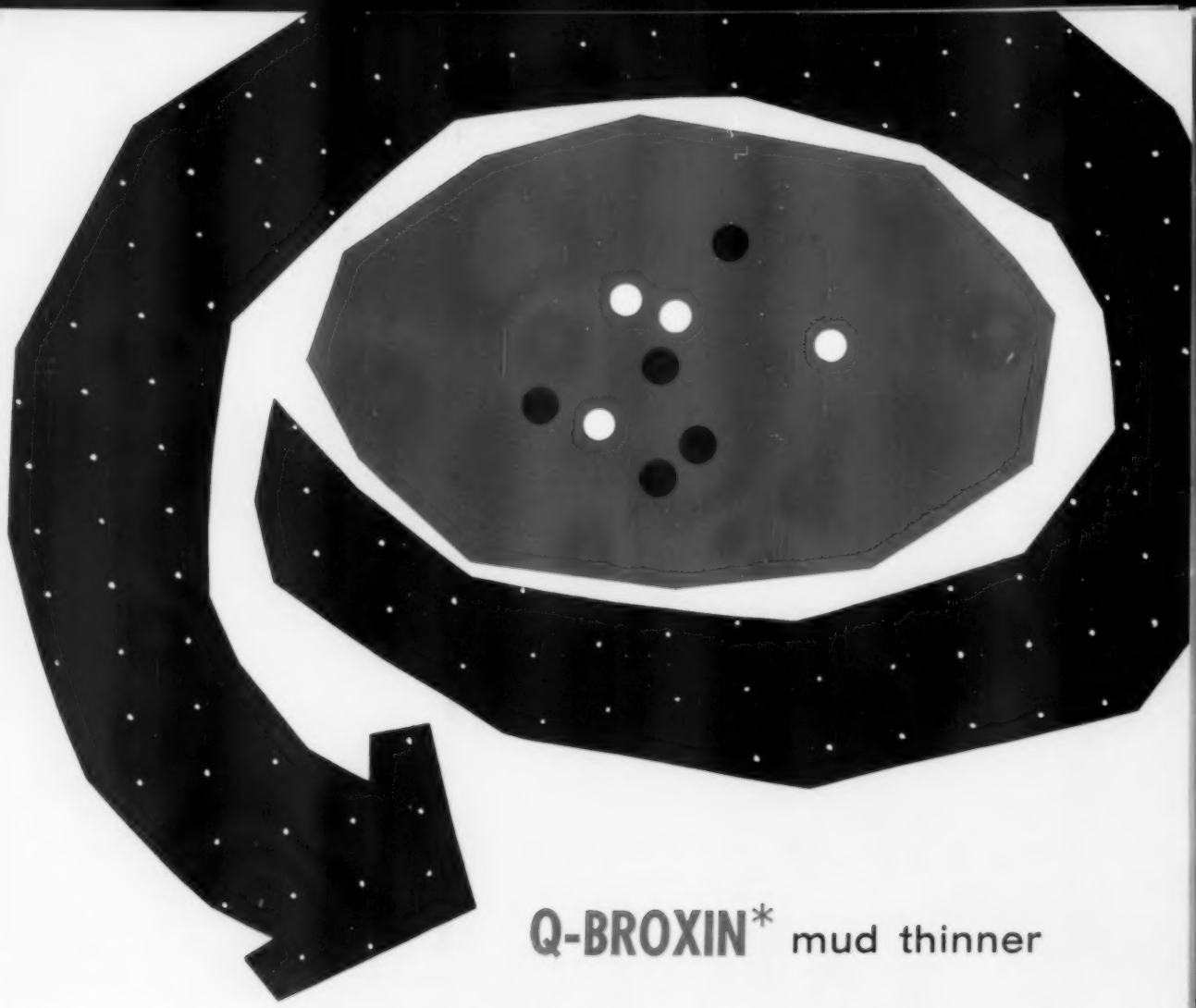

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Q-BROXIN thinner solves so many mud problems that it is used as a general utility mud chemical. Use it wherever quebracho is indicated as a thinner. Use it as an emulsifier, or to break-over and treat lime muds. It works at high temperatures, doesn't cake, and needs no caustic. Specify Q-BROXIN . . . watch it hold down your mud costs!

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CALENDAR

AUGUST

28-30 Instrument Society of America, International Symposium on gas chromatography, Kellogg Center, Michigan State University, East Lansing, Mich.

SEPTEMBER

3-5 Pacific Coast Gas Association convention, Fairmont and Mark Hopkins Hotels, San Francisco.

5-7 New Mexico Geological Society, eighth annual field conference, southwestern Colorado.

8-13 American Chemical Society, 132nd national meeting, New York City.

9-10 Independent Natural Gas Association of America, annual meeting, Shamrock Hilton Hotel, Houston.

9-11 American Institute of Electrical Engineers, conference of the petroleum industry committee, Sheraton Hotel, Philadelphia.

11-13 National Petroleum Association, fifty-fifth annual meeting, Traymore Hotel, Atlantic City, N. J.

12-14 Ardmore, Okla., Geological Society, Criner Hills field conference, Lake Murray Lodge, Ardmore, Okla.

12-14 Wyoming Geological Association, twelfth annual field conference, Southwest Wind River basin, Noble Hotel, Lander, Wyo.

19-21 Rocky Mountain Oil Show, fairgrounds, Casper, Wyo.

20 Southern Gas Association, dispatchers' round-table conference, Baker Hotel, Dallas.

20 Southern Gas Association, compressor station round-table conference, Baker Hotel, Dallas.

22-25 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Mayo Hotel, Tulsa.

23-24 University of Oklahoma, School of Petroleum Engineering conference on fluid flow through porous media.

23-25 American Society of Mechanical Engineers, fall meeting, Statler Hotel, Hartford, Conn.

25 Natural Gasoline Association of America, regional meeting, Northern Hotel, Billings, Mont.

26-27 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

26-27 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, Roosevelt Hotel, New Orleans.

30-Oct. 2 American Oil Chemists' Society, 1957 fall meeting, Netherland Plaza Hotel, Cincinnati.

OCTOBER

1-2 Texas Mid-Continent Oil and Gas Association, thirty-eighth annual meeting, Texas Hotel, Fort Worth.

1-4 National Association of Corrosion Engineers, north-central region, Sherman Hotel, Chicago.

1-4 National Association of Corrosion Engineers, south-central region, municipal auditorium, Oklahoma City.

2-4 Golden Trend Oil Show, Pauls Valley, Okla.

6-9 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fall meeting, Adolphus, Baker, and Statler Hilton Hotels, Dallas.

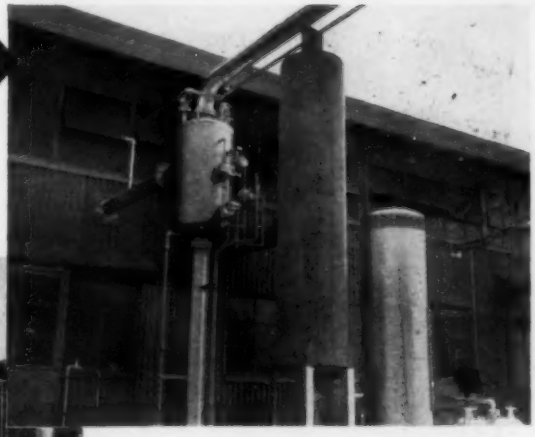
7-9 National Electronics Conference, thirteenth annual meeting, Hotel Sherman, Chicago.

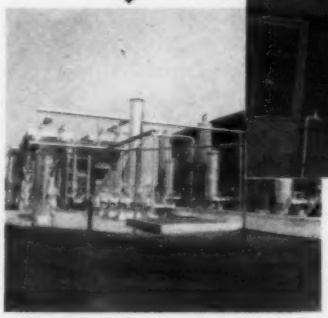
VAPOR PHASE® THERMAL CIRCULATION PERMITS DOLLAR-SAVING REMOVAL OF JACKET WATER PUMPS

Installed in 1952 for a Long Beach Oil Company, this VAPOR PHASE® Unit has Long Since Proved Its Economy of Operation and Smooth, Trouble-Free Performance.

Steam is manifolded from three Clark Bros. 550 hp engines to a single VAPOR PHASE® Unit.

Steam from this VAPOR PHASE® Separator, as well as lube oil and compressor cooling water, are all cooled in aerial condensers.





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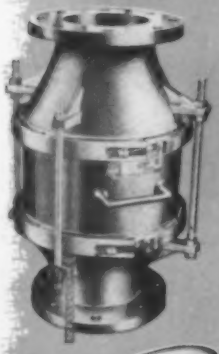
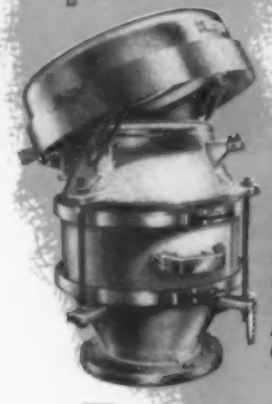
For Maximum Protection of Volatile Liquids in Storage

. . . Equip Your Tanks With BS&B *Lightweight* Tank Vents and Flame Arrestors!

The BS&B Tank Vent, Type 76-16, features a floating seal for positive shut-off under both pressure and vacuum. Positive seal is effected without utilizing the weight of the hinged cover. Vapor pressure within the tank (or atmospheric pressure in the case of vacuum) maintains seal. Cover and major internal components are aluminum with stainless or plated steel hardware; plastic coated bases are cast iron. These vents mount to 125 lb. ASA bolting circles in sizes 6" through 12".



BS&B Flame Arrestors, Type 76-18, for free vent systems, may be mounted either horizontally or vertically. End connections are 125 lb. ASA flanged for mounting to open vent lines of process vessels. Flame bank end flanges are identical to those of the Type 76-17 Arrestor Vent Bases (below). Lightweight, maximum venting capacity and servicing ease are important features of the Flame Arrestor.



BS&B Arrestor Vent, Type 76-17, combines the features of Types 76-16 and 76-18 described above. It functions both as a tank breather and as a cartridge type flame arrestor to prevent ignited vapors from flashing back into the tank. Flame bank is secured by two quick opening V-clamps for easy access to unit for inspection or servicing. Normal venting with the flame bank removed is maintained by simply securing the top unit to the base with one V-clamp. Internals of flame bank are alternate layers of flat and corrugated aluminum strips, in a continuous roll.

Ask your BS&B Representative for Catalog 76-16 or write direct to . . .

BLACK, SIVALLS & BRYSON, INC.

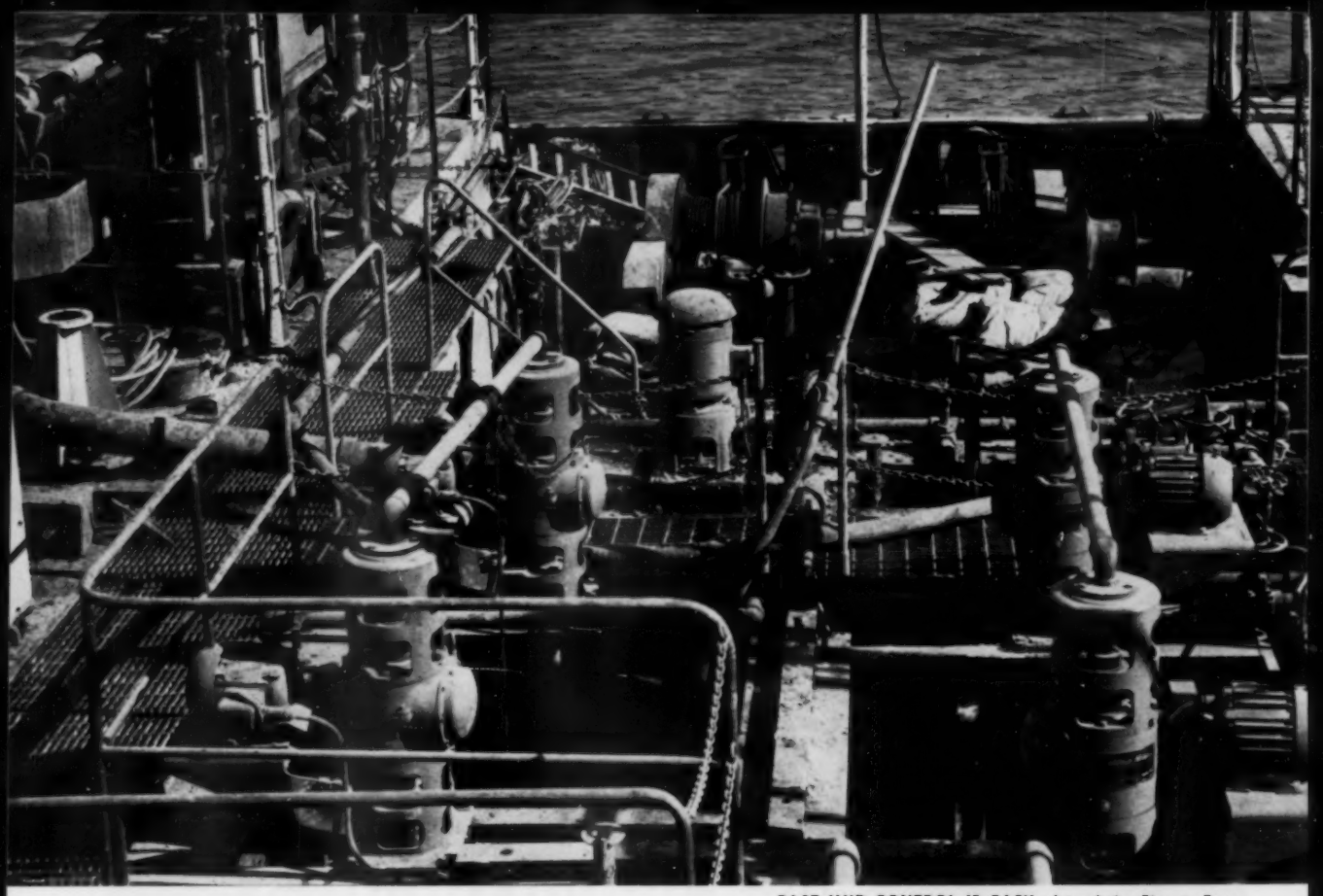
Safety Head — Vent Valve Division, Dept. 2-A8
7500 East 12th Street
Kansas City 26, Missouri

BS&B — ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

7-9	American Gas Association, annual convention, Kiel Auditorium, St. Louis.
7-11	American Institute of Electrical Engineers, fall general meeting, Morrison Hotel, Chicago.
10-11	California Natural Gasoline Association, thirty-second annual fall meeting, Huntington-Sheraton Hotel, Pasadena.
10-12	American Society of Mechanical Engineers, American Institute of Mining, Metallurgical & Petroleum Engineers, fuels conference, Chateau Frontenac, Quebec.
10-13	Louisiana Gulf Coast Oil Exposition, Lafayette, La.
13-15	American Association of Oilwell Drilling Contractors, seventeenth annual meeting, Mayo Hotel, Tulsa.
13-19	OIL PROGRESS WEEK.
15-16	Gas Measurement Institute, sponsored by the University of Kansas, American Legion Hall, Liberal, Kans.
17-18	American Institute of Mining, Metallurgical, and Petroleum Engineers, Southern California petroleum section, fall meeting, Biltmore Hotel, Los Angeles.
17-19	Four Corners Geological Society, second field conference, Gallup, N. M.
18	American Institute of Chemical Engineers, South Texas section, twelfth annual technical meeting, Moody Convention Center, Galveston, Tex.
20-22	National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Peabody, Memphis.
23-25	National Association of Corrosion Engineers, western region, seventh annual conference, U S. Grant Hotel, San Diego, Calif.
23-25	National Association of Corrosion Engineers, seventh biennial Permian basin corrosion tour, Midland-Odessa area, Texas.
24-25	Rocky Mountain Oil and Gas Association, midyear meeting, Northern Hotel, Billings, Mont.
24-25	Western Petroleum Refiners Association, regional technical-industrial relations meeting, Rufus Garrett Hotel, El Dorado, Ark.
25	Natural Gasoline Association of America, southern regional meeting, Washington-Youree and Captain Shreve Hotels, Shreveport.
27-29	Independent Petroleum Association of America, annual membership meeting, Statler Hilton Hotel, Dallas.
31-Nov. 1	American Association of Petroleum Geologists, Mid-Continent regional meeting, Education Building, Fairgrounds, Tulsa.

NOVEMBER

3-8	Society for Nondestructive Testing, second international conference, Hotel Morrison, Chicago.
6-8	Gulf Coast Association of Geological Societies, seventh annual convention, Roosevelt Hotel, New Orleans.
6-8	Society of Automotive Engineers, national fuels and lubricants meeting, Hotel Statler, Cleveland.
11-14	Society of Exploration Geophysicists, twenty-seventh annual meeting, Statler-Hilton Hotel, Dallas.
11-14	American Petroleum Institute, thirty-seventh annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
12-14	National Association of Corrosion Engineers, northwest region fall meeting, Penn-Sheraton Hotel, Pittsburgh.
22	Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.



FAST MUD CONTROL IS EASY aboard the Rincon. Four turbine-type LIGHTNIN Mud Mixers, foreground, keep mud uniform. LIGHTNIN Flash Mixer, just left of center, incorporates weight and gel additions as fast as needed and without clogging.

Here's why **mud control is no problem** *on Richfield's new deep-water rig*

Hop aboard one of the first ocean-going drilling rigs—Richfield Oil Corporation's 600-ton converted LSM Rincon.

A quick glance tells you nothing has been spared to make this pioneer vessel safe, comfortable, efficient as it probes the bottom in waters up to 300 feet deep off the California coast.

Stroll over to the mud tanks and see how the Rincon's drilling crew keeps mud in top condition—ready for instant use.

Uniform mud . . . always

Above the mud tanks you see four electrically powered LIGHTNIN Mud Mixers. From each mixer hangs a shaft with a big turbine at its lower end.

These turbines churn the mud powerfully, creating strong, smooth flow and interchange throughout the tank. In constant motion, mud cannot settle out; *stays fully uniform* at the desired weight and viscosity.

Heavier mud . . . in seconds

When the driller needs heavier mud, he gets it—*in seconds.* Weight and gel additions are fed to the tanks through a LIGHTNIN Flash Mixer mounted in an open-bottom well. A high-speed propeller on this mixer instantly breaks all lumps and disperses weight and gel finely in the mud.

Then the big LIGHTNIN turbines swiftly mix in all additions—equalize the mud *as fast as new ingredients can be fed to it.*

Lower-cost drilling

You get faster, safer, more productive drilling with mixers like these on *your* rigs. Fewer stops; no long waits for heavier mud; *surer protection* against blowouts.

Best of all, you cut drilling cost *with* LIGHTNINS *in your mud tanks. Save the entire cost and upkeep of an extra stand-by mud pump. You need only* one *stand-by pump when you mix with* LIGHTNINS.

See for yourself what amazingly fast mud control you get with LIGHTNINS—at less than your present cost. Your LIGHTNIN Mixer representative will gladly arrange a visit to a LIGHTNIN-equipped rig near you. Call him today (he's listed in Composite Catalog). Or write us direct.

MUD REALLY MOVES. On top, underneath, al through the tank, it keeps equalizing—can't settle out. Powerful flow gives you *instant* control of mud weight and viscosity.

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MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc., 174-h Mt. Read Blvd., Rochester 11, N.Y.

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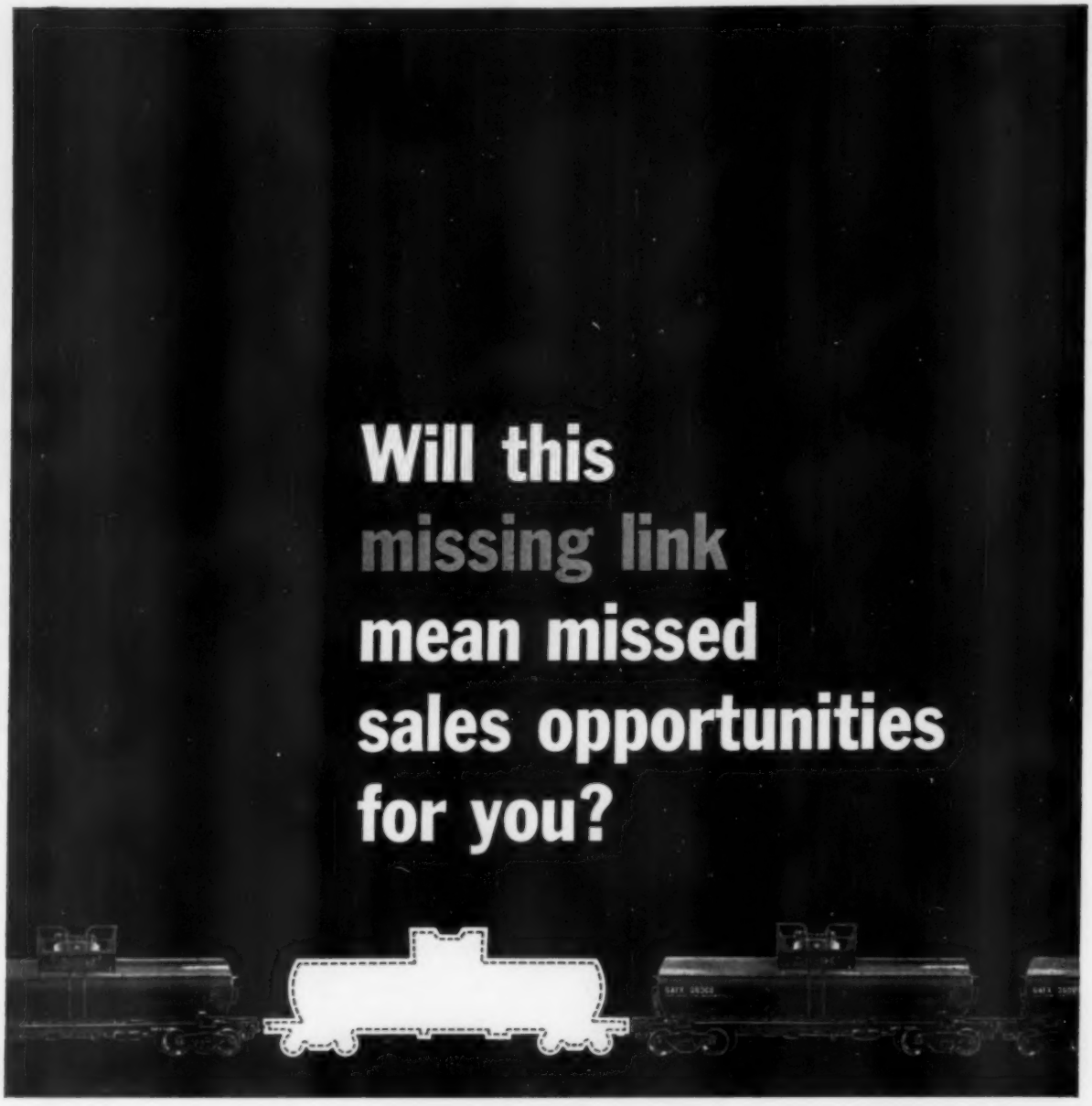

You'll want every general-purpose tank car you can lay your hands on in the decade ahead. Forecasts point to booming production and sales, and a vastly increased demand for shipping facilities. But normal obsolescence affects tank cars, too. A shortage of steel, plus the time required to build, will make for scarcity. That's why alert businessmen are already examining transportation requirements—planning for tomorrow's markets . . . today.

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TULSA, OKLAHOMA

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JOURNALLY SPEAKING

The Fault of Sodom

BROWSING AROUND a musty corner of the Journal library the other day we ran across a time-yellowed pamphlet about references to oil and gas in the Old Testament.

Attempts to correlate geology and theology and to explain biblical miracles in terms of natural phenomena may run the risk of affronting both religion and science. But the author of this pamphlet apparently was both a devout Christian and a devoted scientist.

In the Bible and also in other ancient documents and archeological researchings he found many references that convinced him that the early peoples who developed in the "cradle of civilization" now known as the Middle East had frequent contacts with natural occurrences of oil and gas.

His most fascinating speculation is his geological explanation of the destruction of Sodom and Gomorrah by "fire and brimstone" as chronicled in Genesis, Chapters XIII to XIX.

This cataclysm, he reasons, cannot be explained like the destruction of Pompeii because there is no evidence of volcanic action in the region of Palestine.

But, he points out, the Dead Sea and the Valley of the Jordan lie in a great fault rift that extends on through the Gulf of Aqaba, across the Red Sea, and into the upper Nile Valley in Africa. And while the Dead Sea is only about 10 miles wide, the rock strata on the west are as much as 4,800 ft. lower than the corresponding formations on the eastern shore. Obviously there have been some terrific earthquakes and upheavals in this region.

Now the biblical "five cities of the plain," including Sodom and Gomorrah, were located, according to this author, in what was then dry land but is now the southern and very shallow arm of the Dead Sea. The Bible describes this plain as the "vale of Siddin, full of slime pits," and this author says the slime pits undoubtedly were natural oil seepages.

Now you see how the stage is set for the great catastrophe. The Bible says the wicked inhabitants of Sodom and Gomorrah were destroyed because of their faults, but this author says that the destruction was accomplished by a geological fault.

There was a tremendous earthquake. The fault block slipped. Cracks opened in the earth. Sulfurous gas and oil erupted and became ignited in a mighty holocaust, "and lo the smoke of the land went up as the smoke of a furnace." Then the area sank and the waters of the Dead Sea flowed in and covered the site of the disaster.

Oil men who remember their Sunday School lessons will recall that only Lot and a few other righteous persons escaped from Sodom. But Lot's wife "looked back" while en route to safety, and was transformed into a pillar of salt.

There are pillars of salt to this day in the area, says this pamphlet—great intrusions of crystalline rock salt, deeply eroded, caverned, and creviced into fantastic shapes. The local Arabs believe that this salt fell from the sky and formed around Lot's wife and other unfortunate evacuees from Sodom and Gomorrah, but the author believes they were extruded from below and eroded into somewhat humanlike shapes.

So there's his story. You can take your choice of geology or theology, or combine them as suits your inclination.

But any oil man familiar with the nature and occasional behavior of oil and gas seepages should be able to link such phenomena with many biblical references.

Noah perhaps calked his Ark with natural bitumen, though the medieval translators, having no word for asphalt, rendered the material as pitch. And in describing the Tower of Babel, Genesis says "they had brick for stone, and slime they had for mortar." This also probably was asphalt, for recent research shows that the ancient Babylonians made extensive use of natural bitumens for waterproofing their brick structures.

If the flood hadn't liquidated the customers for his shipyard, Noah might have developed the asphalt industry as a sideline and thus would have beat out Colonel Drake for the title of the father of the oil industry.

—Henry D. Ralph.

Here's the most modern hook-wall packer yet!

Product No. 420-E

The NEW BAKER Model "E" RETRIEVABLE CASING PACKER

Drawing on the experience and know-how gained from 30 years of leadership in the field of design and development of high-performance retrievable squeeze tools, BAKER has combined many of the features from these tools with the simplicity of J-Slot operation to make possible this short, most modern of all hook-wall packers.

Only three feet long, the Model "E" Retrievable Casing Packer has the same rocker-type slips and proven dependable packing element used so successfully on BAKER retrievable squeeze tools. No drag springs to make a long, cumbersome tool. No slip tie-links or guide grooves to allow the slips to become stuck or cocked. No restricted bore to prevent running instruments through the packer.

Easy to run (just rotate to the right and set down) and easy to retrieve (just pick up the tubing) the BAKER Model "E" Retrievable Casing Packer is a model of high-performance in a small package.

See your BAKER man today for additional information on how the BAKER Model "E" Retrievable Casing Packer can solve your hook-wall packer needs.

BAKER

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

Law or no law, gas prices are climbing

IN spite of the Phillips decision, in spite of the Federal Power Commission, in spite of the congressional delay in amending the law, the field price of natural gas is moving steadily upward.

Opponents of the Harris bill to give legal recognition to the commodity value of gas may hope that by delaying action they can keep the price down just that much longer. But the business world is recognizing the economic facts and is pricing gas on the basis of supply and demand and the conditions of the market place.

The field price of gas is climbing. It is climbing because purchasers need gas, can't buy it for less, and think it's worth the price.

THE DRAMATIC EXAMPLE of this was the big contract for offshore gas at 21.4 cents per thousand approved by FPC in June. Earlier FPC had rejected this price. But when producers refused to sell for less, FPC reversed itself with the statement that assurance of supply is more important to consumers than the initial contract price.

While that made headlines, dozens of other new supply contracts were quietly being made between producers and pipelines all over the Southwest. And practically all of them stipulate initial prices well above the going rates that prevailed before FPC took jurisdiction.

Here's a sampling of 140 typical contracts for pipeline gas made in four states during the 5 months March through July 1957: The average initial price is 14.59 cents per thousand. That's a simple average, not weighted as to quantity nor adjusted for contract terms.

In 1955, the first full year after the Phillips decision, the weighted average field price of all marketed production in these four states was 9.2 cents, according to the Bureau of Mines. This included old and low-price contracts, distress sales, and other factors, so the basis isn't fully comparable. But the current average of 14.59 for new sales gives a good indication of how much more buyers are willing to pay today.

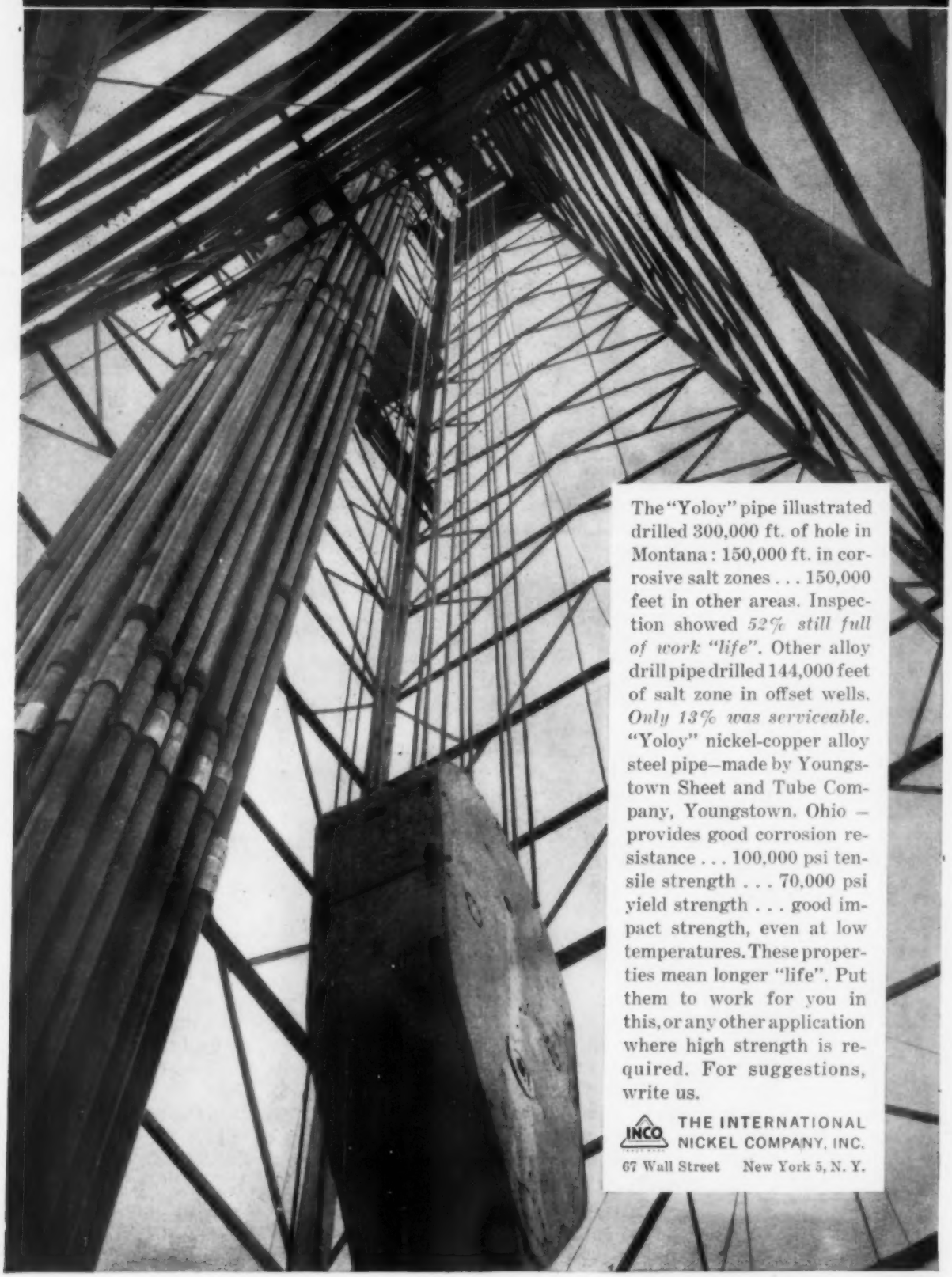
A breakdown by states is interesting. In Kansas the 5-month average of new contracts is 13.49 cents, compared with the 1955 figure of 11.1. In Oklahoma it is 14.25, compared with 7.4. In Texas it is 13.39, compared with 8.0. And in Louisiana it is 17.23, compared with 11.3.

THESE NEW PRICES weren't based on any sort of cost-of-service utility formula. They are the result of tough arm's-length bargaining between practical businessmen acting under competitive conditions.

However the law may read, it will be a practical impossibility for FPC to roll back these 140 contracts plus thousands of others. In every one of these—as with that 21.4-cent offshore hassle—the buyer is satisfied that the new supply is worth the price.

The moral of this is simple: Law or no law, field prices will go up so long as buyers are willing to pay what producers ask.

"Yoloy" drill pipe "lives" longer



The "Yoloy" pipe illustrated drilled 300,000 ft. of hole in Montana: 150,000 ft. in corrosive salt zones . . . 150,000 feet in other areas. Inspection showed *52% still full of work "life"*. Other alloy drill pipe drilled 144,000 feet of salt zone in offset wells. *Only 13% was serviceable.* "Yoloy" nickel-copper alloy steel pipe—made by Youngstown Sheet and Tube Company, Youngstown, Ohio—provides good corrosion resistance . . . 100,000 psi tensile strength . . . 70,000 psi yield strength . . . good impact strength, even at low temperatures. These properties mean longer "life". Put them to work for you in this, or any other application where high strength is required. For suggestions, write us.

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67 Wall Street New York 5, N. Y.

The OIL AND GAS JOURNAL

August 26, 1957

Next Year's the *BIG* Year for Oil in Washington

1957		1958	
Military:	House passed bill restricting military land withdrawals.	**Depletion:**	House committee will start tax study in January. Depletion allowance is top item.
Alaska:	House passed Alaska inland water leasing bill.	**Imports:**	Action must be taken on extending Reciprocal Trade plan. By that time, congress will know if voluntary import plan is working.
Offer:	Committees probed European oil lift; house delayed action on Harris gas bill.	**Natural Gas:**	Drive for passage of Harris natural-gas bill will be resumed in House.
		Mergers:	Bill requiring 60-day notice on mergers to be pushed; oil industry vitally affected.
		Regulation:	FPC's regulatory authority may be probed.

Congress: '57—Not Much; '58—Plenty

WASHINGTON.—Congress talked loud and did little about the oil industry this year. But 1958 will produce more than words. The agenda is loaded.

The Harris natural-gas bill was sprung from committee this session, but the House was in no mood to vote on it. Final action—next year.

Natural gas may not, however, be the top industry battle for 1958. When Congress reconvenes in January, efforts to cut the 27½ per cent depletion allowance and set quotas on oil imports may grab the headlines.

Another bill that could kindle a fire affects corporation mergers. The oil industry, in particular, has a vital stake in it.

The big issues . . . The House ways and means committee will start its tax studies the first week in January. An attack can be expected on the depletion allowance given the industry.

Chairman Jere Cooper of Tennessee has announced the first hearing for January 7. Those wishing to appear are asked to write the committee clerk.

The imports question will face the lawmakers in January.

By the time Congress convenes the voluntary control plan will have been in operation nearly 5 months, and its success or failure will be a matter of record.

If the plan fails and imports are on the rise again, the demand for quotas will bring almost unbearable pressure on Congress. The hour for such decision will arrive when action is taken on extending the 24-year-old Reciprocal Trade Act, which expires next spring.

Two years ago Congress dropped the quota idea for oil imports and wrote into the reciprocal law the national-security clause requiring the President to order controls of imports that threaten the nation's defense.

Former Mobilization Director Arthur S. Flemming certified last April that imports were causing such a threat, and President Eisenhower installed the new voluntary program this summer as a "last resort" to avoid formal controls.

Oil-state congressmen charge the administration has evaded application of the national-security clause and contend that only congressional action will get the job done.

Another stab will be made in 1958 at passage of the Harris gas bill restricting the Federal Power Commission's authority to regulate the natural-gas industry.

The bill's sponsors this session had little hope the bill would go to the White House, but they expected certainly it would pass the House. Then, in the final days, House leaders decided there was too much risk in bringing up the bill in the wake of the nerve-fraying fight over civil rights.

Other bills . . . One piece of legislation set for action in 1958 affects all industry in general—but oil in particular. It requires corporations planning to merge to give 60 days advance notice to the Justice Department and the Federal Trade Commission.

The bill is backed by the Government, opposed by oil men.

A bill authorized by Rep. Carl Vinson of Georgia is given the best chance for passage among the oil measures of 1958. It sets aside certain California coast islands—San Nicolas, San Miguel and Prince Islands—as Naval Petroleum Reserve No. 5. The Navy Department once planned to

test the islands for oil, but Congress refused to provide the money.

Other oil industry bills which may get congressional attention next year would (1) make all federal oil and gas leases subject to competitive bidding, (2) create a National Petroleum Commission, (3) divorce refining from marketing, and (4) finance research programs on developing oil shale production, making butadiene from grain, and using alcohol in automotive gasoline.

General industry legislation which will interest oil men in particular include tax revision, extension of the fair labor standards law, and revision of the Taft-Hartley Act.

Congress won't slow down its investigation spree next year. Both the House and Senate are expected to probe alleged lawmaking by federal regulatory agencies. When, and if, the Federal Power Commission comes under their scrutiny the oil industry will sit up and take notice.

The 1957 record . . . The current Congress is dragging to a close with little written into the statutes affecting oil.

Nearly 100 of the 12,000 bills introduced concerned the industry directly, but few of these received committee attention. Still fewer were reported out of committee.

Three measures passed the House. They would:

. . . Control military land withdrawals and thus, in part, keep valuable offshore and upland oil areas out of the hands of the Defense Department.

. . . Permit the Interior Department to lease oil and gas rights on lands beneath inland navigable waters in Alaska.

. . . Set new rules to control business groups advising federal departments. The National Petroleum Council is affected.

The military land withdrawals bill last week also passed the Senate. It was returned to the House for approval of minor changes before going to the White House for signature.

The bill requires congressional approval of any Defense Department plan to withdraw more than 5,000 acres of public lands. It also limits the use to which such lands may be put.

In passing the measure, Congress rejected claims made by the Navy last year that it has the right to explore for oil on any area under its control. The bill provides that no government agency may search for oil on lands not set aside as a naval petroleum reserve.

Probers busy . . . If there was little oil and gas legislation this year, there was plenty of investigating of the industry by the lawmakers.

Sen. Joseph C. O'Mahoney of Wyoming was the busiest. Subcommittees which he headed dug into the oil lift to Europe after the Suez Canal was closed. The inquiries spread into industry pricing practices, control of oil pipelines, relations between Arabian American Oil Co. and the Saudi Arabian Government and other subjects.

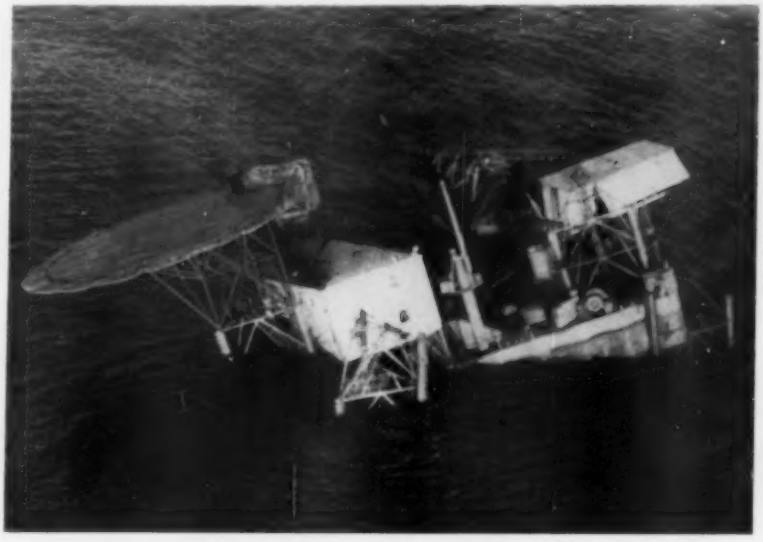
The House commerce committee also studied the oil lift and took much of the heat out of O'Mahoney's investigating by reporting that the oil industry did a good job.

Another House committee delved into the Government's tanker building and transfer programs, including deals through which foreign interests acquired surplus vessels.

Rep. James Roosevelt of California headed a subcommittee that investigated problems of independent service station operators and their relations with suppliers.

Another congressional subcommittee released a report criticizing industrial bigness. The report carried no conclusions, but the inference was plain that big companies continue to grow bigger at the expense of little companies.

If the investigators accomplished anything, it didn't show up in legislation passed by this session of Congress. That's one reason eyes of the oil industry now will turn to 1958.



Leg on tripod gives way, and . . .

New Barge Topples in Gulf

NEW ORLEANS.—A new offshore drilling barge collapsed in the Gulf of Mexico August 15 while on its first assignment.

Three men were injured when one leg of the Deepwater No. 2 suddenly gave way. The injured, along with some 20 other crew members, were rescued by nearby boats as the vessel toppled in 25-ft. water in the Bay Marchand area off Louisiana.

The $1,850,000 mobile platform is owned by Deepwater Exploration Co., Houston. It was commissioned at New Orleans July 19 and was on location for Gulf Refining Co. about 3 miles from shore.

Built by R. G. LeTourneau, Inc., the three-legged drilling structure was a "miniature" model of the tripod platforms built earlier for deep-water drilling. The Deepwater No. 2 was designed for workovers and well completions in addition to drilling to depths of 10,000 ft. (OGJ, July 22, p. 56).

The Deepwater No. 2 was the fourth offshore drilling vessel to plunge into the Gulf of Mexico within the past 5 months. Similar fates had been met recently by C. G. Glasscock Drilling Co.'s "Mr. Gus," Golden Meadow Well Service Co.'s "Mister K," and John W. Mecom's "Ed Malloy."

Cause of the latest accident had not been determined last week. An early report indicated the trouble arose from the sudden sinking of one of the legs into the gulf floor. The U. S. Coast Guard has started an investigation of the accident.

Mexican Gas Goes North

● Texas Eastern is the first to start large-scale flow of Mexican gas into the U.S., but others may follow

McALLEN, Tex. — High industry officials of Mexico and the United States late last week took part in a valve-turning ceremony of historic importance to both countries.

Sen. Antonio J. Bermudez, director general of Petroleos Mexicanos, formally started gas flowing across the Rio Grande into the new Texas Eastern Transmission Corp. line serving northeastern U. S. markets 2,000 miles away. Gas from the nearby Pemex absorption plant at Reynosa is pumped into the 422-mile, 30-in. extension of Texas Eastern's main line from McAllen to Beaumont (see map).

The valve-turning took place at a metering station just south of the border. Its importance was underlined by a guest list including, besides Bermudez, several other top officials of the Mexican Government oil agency; Kennedy Crockett, head of the Department of Mexican affairs, U. S. State Department; Olin Culberson, chairman of the Texas Railroad Commission; and for Texas Eastern, Chairman George R. Brown, President Orville S. Carpenter, and Vice Presidents Baxter D. Goodrich, E. R. Cunningham, and Mills Cox.

The event was heralded by speakers as the beginning of a long period of mutual benefit to the people of both countries. The deal, which was 5 years in the making, will mean:

. . . The first large-scale imports of natural gas into the United States, under a Federal Power Commission policy permitting foreign gas to supplement U. S. supplies. The Mexican gas is barely nosing out Canadian gas as the first foreign gas to reach the U. S. in large quantities. Pacific Northwest Pipeline Corp. is scheduled to start taking Canadian gas through Westcoast Transmission's line within a few weeks.

. . . A new source of supply for Texas Eastern which will provide increasing volumes as northeastern Mexico fields are developed.

. . . A market for Mexico which was not available at home, at least at this time. Revenue from the export will help finance expansion of the Mexican industry.

. . . Prospects for better prices for U. S. gas producers. The FPC recognized the increasing value of gas in approving the initial contract price of 14.2 cents per M.c.f. This is as high as some prices paid several hundred miles closer to market. The Mexican gas will escalate 0.2 of a cent each year for the life of the 20-year contract.

Mexican gas prize . . . Completion of this project is a personal triumph for Bermudez as well as an important step for Texas Eastern.

After Bermudez obtained a good price for the gas (four times as much as Mexico has paid for Texas imports to Monterrey), he still had to sell Mexico on the idea of letting its surplus gas go outside the country. Texas Eastern won out over several other U. S. companies who tried to get Bermudez' name on a contract.

The deal was completed in September 1955, and a year later the FPC gave the go-ahead. The project was started late last year and completed earlier this month.

Initial imports will amount to 115,000,000 cu. ft. daily. The contract calls for an increase to 200,000,000 cu. ft. daily when available. This is viewed as only the beginning of an ever-growing flow of Mexican gas into the United States.

Pemex is supplying Texas Eastern from a 300,000,000-cu.-ft. daily plant near Reynosa which taps three fields. In its FPC application Texas Eastern estimated reserves in these fields at 840 billion cubic feet. Pemex reported deliverability of the fields a year ago to be 425,000,000 cu. ft. daily. It is supposed to be increasing at the rate of 100,000,000 cu. ft. daily a year, as more wells are drilled. Supply from fields in this area is expected to reach 1 billion cubic feet daily in a few years.

Some 90,000,000 cu. ft. daily from the Reynosa plant goes to Monterrey.

Mexican gas is an important part of the Texas Eastern supply picture. As more Mexican gas becomes available, Texas Eastern will be in the best position to take it. But other companies are known to be interested.

Texas Eastern expansion . . . The Mexican project is part of a larger $175-million Texas Eastern expansion program, the biggest in the industry this year.

The Mexican line and related facilities will add 250,000,000 cu. ft. daily to system capacity with Texas and Louisiana supplying more than half the gas at first. The McAllen-Beaumont line is linked by a 45-mile, 24-in. line to the Wilcox Trend Gathering System near Provident City, and with the other main line of Texas Eastern going to New Jersey.

The Kosciusko, Miss. - Uniontown, Pa., segment of the main line is being looped by more than 600 miles of 30-in. A large compressor-station expansion also is under way. All told the company will add 360,000,000 cu. ft. daily to capacity this year. It will lay more than 1,000 miles of 30-in. pipe. By the time the program has been completed this fall, Texas Eastern will have a capacity of 1,811,520,000 cu. ft. daily with 540,270 compressor horsepower in 54 stations and 5,900 miles of natural-gas pipeline from Mexico to New England (OGJ, July 22, p. 81).

Rangely Is Unitized

• Ten-year battle for conservation is won; recovery may be doubled under water-flooding program

DENVER.—Unitization of northwest Colorado's Rangely oil field, largest in the Rocky Mountain area, is scheduled to become effective October 1.

Operators believe this conservation step, together with a secondary-recovery program, will lengthen the field's life to 30 or 40 more years and possibly double production.

Agreement on unitization of the field was announced last week by C. L. Pickett, western production division superintendent for The California Co. and chairman of the Rangely Operators' Committee. Pickett said 99½ per cent of the working interests and 93 per cent of the royalty owners had signed the agreement.

The Colorado Oil and Gas Conservation Commission jubilantly approved the unit proposal a day after Pickett's announcement and sent it to the U. S. Geological Survey.

Warwick M. Downing, commission chairman, said USGS had already promised to approve the agreement, even though 100 per cent participation was lacking. The federal agency is expected to act on the proposal within 10 days. When the unit begins operating it will come under regulatory supervision of USGS because 9,000 acres of the 19,120-acre unit are public lands.

The benefits . . . Downing predicted that unitization of the 481-well field, coupled with secondary recovery, will result in additional oil recovery of 400,000,000 bbl.

"The oil in place in the Rangely field at the time of discovery (1932) was estimated at from 1,500,000,000 to 2,000,000,000 bbl.," Downing said. "It was originally estimated that ultimate recovery without best conservation practices would be about 25 per cent, or roughly 350,000,000 bbl. Up to date about 225,000,000 bbl. of oil have been produced, and it is my belief that as a result of this unit agreement, another 400,000,000 bbl. will be produced, making a total recovery of approximately 50 per cent."

"The Rangely operators deserve the utmost credit for this accomplishment," he added.

The engineering subcommittee of the Rangely operators group also estimated primary recovery at 350,000,000 bbl. and forecast that increased production due to gas injection and water flooding would add 385,000,000 to 437,000,000 additional barrels.

Daily oil production now ranges between 71,000 and 74,000 bbl. per day.

Pickett said the Rangely unit, with 45 operating interests and 450 royalty owners, is the second largest in the United States. It is surpassed only by SACROC unit in Texas which has 100 working interests.

The California Co. holds the largest interest in Rangely, 45.598 per cent, and therefore will be the unit operator. Other principal interest owners are Phillips Petroleum Co., 6.32 per cent; Husky Oil Co., 3.38 per cent; Equity Oil Co., 4.10 per cent; Utah Southern Oil Co., 4.10 per cent; Pan American Petroleum Corp., 10.07 per cent; The Texas Co., 3.98 per cent; Union Pacific Railroad, 12.97 per cent; the Cameron family, 3.97 per cent; Tidewater Oil Co., 1.13 per cent; and Sharples Oil Corp., 1.45 per cent.

The recovery plan . . . Unitization of the field climaxed more than 10 years of work by the commission and operators to curb the flaring of gas produced along with the oil. The flare currently averages about 45,000,000 cu. ft. daily.

Pickett said the flare will be reduced "substantially" following relocation of equipment and facilities—probably within 2 or 3 months after the start of unit operation.

Jack Tarner of Phillips Petroleum said a two-phase secondary recovery program is contemplated—gas injection and water flooding. The operators already are sending about 95,000,000 cu. ft. daily back to the producing Weber reservoir.

Tarner said engineering proposals for a pilot water flood will be submitted to other operators and USGS in 30 days for approval.

The Rangely program envisions a peripheral water flood using every other well around the center of the field.

He added that the five-spot system might be used in the tighter formations in the east portion of the field.

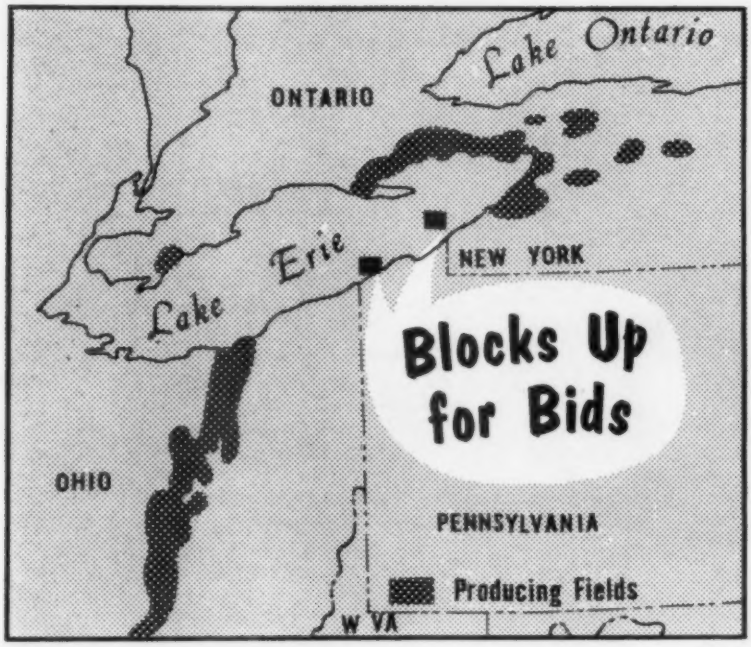
"I believe we will be able to get into a complete water-flood program in 3 to 5 years," Tarner said.

The amount of water to be used in testing has not yet been decided but probably will range between 5,000 and 10,000 bbl. daily.

Long-range program . . . Of the 481 wells in Rangely field, 441 are producing, 19 are being used for gas injection and 21 are shut in or abandoned.

Eventually the operators plan to sell gas remaining after secondary-recovery use to a transmission company. Tarner said the gas could be blended with richer gas for sale to Pacific Northwest Pipeline Corp., which has offered to buy 25,000,000 to 40,000,000 cu. ft. a day.

FOUR of the principals involved in unitizing Colorado's Rangely field are, left to right, Jack Schwabrow, Casper, Wyo., regional supervisor of U. S. Geological Survey; H. C. Bretschneider, vice chairman of Colorado Oil and Gas Conservation Commission; C. L. Pickett, chairman of Rangely Operators' Committee; and Warwick M. Downing, commission chairman.



New Erie Play Expected

Pennsylvania offering two large offshore tracts lying on trend of oil-gas fields stretching from Ohio to Ontario

HARRISBURG, Pa. — Two large blocks of leases in a much-coveted area offshore in Lake Erie are being put up for bids next month by Pennsylvania.

The tracts contain a total of 35,710 acres lying in the water gap of an oil and gas trend stretching from Ohio into Ontario and New York. Geologists for some time have considered the area an excellent drilling prospect.

Pennsylvania officials for months have been arranging to offer the submerged area for exploration (OGJ, Dec. 24, p. 111). The area is under supervision of the division of minerals, department of forests and waters. Forms for the required bid proposal, the lease agreement, and maps showing the areas may be obtained from the division.

Officials announced they will accept sealed bids until 2 p.m. September 24. Then they will be opened publicly. Each bid must be accompanied by a certified check for $2,500.

The tracts . . . The two blocks are in parcels of:

. . . 19,130 acres for Block 1. It is described as the area bounded on the north by latitude 42° 05′ North, on the east by longitude 80° 25′ West, on the south by a line parallel to the lake shore and one-half mile from it.

. . . 16,580 acres for Block 2. It is the area bounded on the north by latitude 42° 20′ North, on the east by longitude 79° 50′ West, on the south by latitude 42° 15′ North, and on the west by longitude 79° 55′ West.

In both areas, the state warns that extreme care shall be used in drilling within 3 miles of shore to protect fish-breeding grounds.

An old area . . . Offshore operations in Ontario's Lake St. Clair and western Lake Erie have been going on for some time.

But drilling has not been tried in the eastern half of Lake Erie where many exploration men consider the chances for success even better.

Previous exploration has set up this trend:

Ohio's great Clinton-Silurian belt of fields starting near the Ohio River stops short at the southern lakeshore. These are mostly gas fields with some oil. On the northern shore, New York's Chautauqua County gas fields south of Buffalo and Ontario's Silurian fields on the Niagara Peninsula rim the water.

Geologists believe the trend extends across the shallow lake in one great Silurian belt. The chain of fields maintains a rather constant position 60 to 70 miles east and south of the crest of the Cincinnati arch. They are stratigraphic fields, found only by drilling on trend.

The sands are shallow—600 ft. in Ontario to 5,000 ft. in Ohio. Potentials often are good—up to 15 million cubic feet for gas wells. The fields are exceptionally long lived.

New technique . . . Drilling in eastern Lake Erie likely will bring into play the techniques and tools used by Canadians in their offshore work in the western lake.

The setup actually is little different from that used in the Gulf of Mexico once operations are started. Completions, however, are definitely different.

Consolidated West Petroleum, Ltd., has completed more than 40 wells in water up to 65 ft. deep in the lake. Portable steel towers and drilling platforms are used. Drilling is done with cable tools.

Record Gas Price

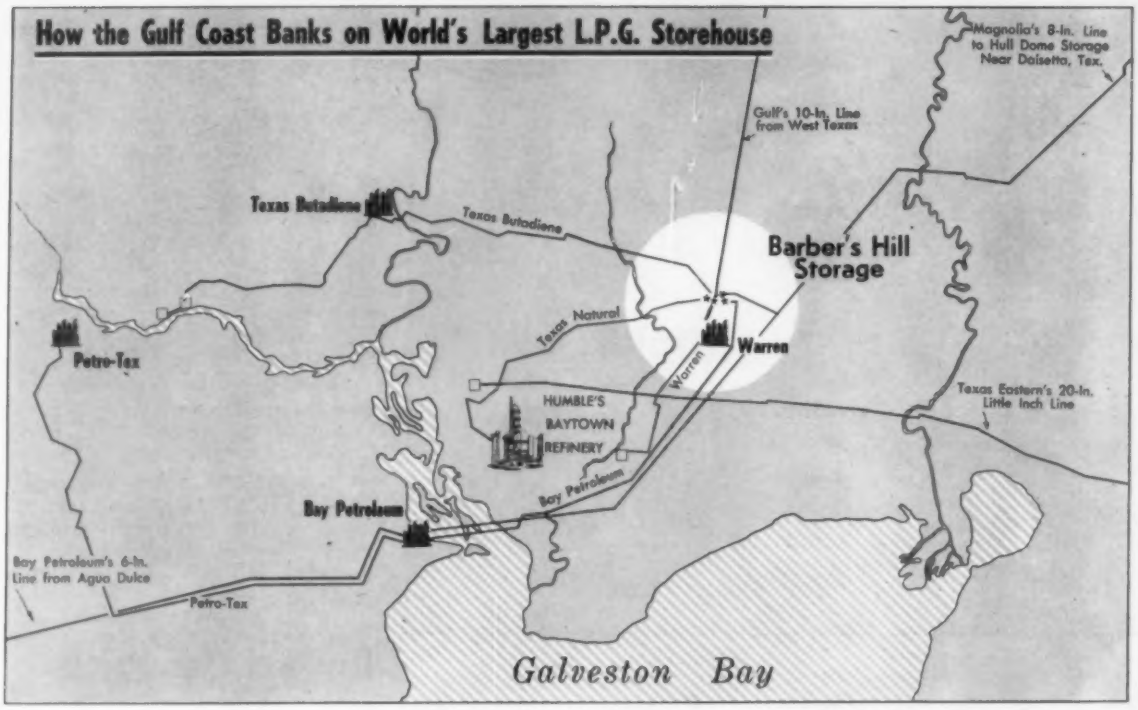
Texas Eastern pays 22.6 cents in Louisiana deal

WASHINGTON.—The highest price for natural gas yet quoted for interstate sale—22.6 cents per M.c.f.—was laid before the Federal Power Commission last week by four independent producers in Rayne field, Louisiana.

The new high was set in contracts under which Continental Oil Co., M. H. Marr, Sun Oil Co., and General Crude Oil Co. will sell 100,000,000 cu. ft. daily to Texas Eastern Transmission Corp. The previous high was 21.4 cents in contracts for offshore gas between the C.A.T.C. group and Tennessee Gas Transmission Co.

The new gas will supply a $50-million expansion of the Texas Eastern system, for which application was filed at the same time. The project calls for building 267 miles of line and 2,200-hp. in compressor capacity by Texas Eastern and 65½ miles of loop line and 4,000 hp. by the affiliated Texas Eastern Penn-Jersey Transmission Corp.

Texas Eastern plans to build 22 miles of 14-in. supply line in Louisiana, 105 miles of 30-in. line paralleling sections of its system between Opelousas, La., and Kosciusko, Miss., and 140 miles of 30-in. paralleling sections between Kosciusko and Uniontown, Pa. The additional compressor capacity would be built in a new compressor station in Louisiana. Total cost is estimated at $38.9 million.



New Era for Barber's Hill and L.P.G.

HOUSTON.—Barber's Hill salt dome, which turned up one of the Gulf Coast's most prolific oil fields, has plunged headlong into a new role as the world's largest underground reservoir for storing L.P.G.

Enough salt has been leached out of the big dome to store 6,000,000 bbl. of light hydrocarbons—about one-sixth of the total L.P.G. underground storage capacity in the nation.

As a major oil field, Barber's Hill has already yielded 105,000,000 bbl. of oil since discovery in 1918. Operators on the flank of the dome are still producing about 2,000,000 bbl. annually.

Now, in its second phase of usefulness to the industry, the dome is fast becoming a main cog in the Houston area's petrochemical complex and distribution center.

Since underground storage of L.P.G. is still in its infancy, chances are that Barber's Hill's present capacity for storage will continue to grow as new facilities are added in the mushrooming Houston area.

For one thing, the conversion of Texas Eastern Transmission Corp.'s Little Big Inch from natural gas to products will be a stimulus to underground storage of L.P.G. on the Gulf Coast. Shipment of L.P.G. on the 20-in. line will mean greater development of the L.P.G. market in the heavy consuming areas of the northeast part of the U. S.

The huge cavity 25 miles east of Houston is already tied in with two petrochemical plants, two fractionating plants, and a web of pipelines (see map). Some of the lines carry large consignments of liquid hydrocarbons from New Mexico, West Texas, and South Texas.

Four operators have drilled 23 storage wells into the salt dome: Warren Petroleum Corp., Bay Petroleum Corp., Texas Butadiene & Chemical Corp., and Texas Natural Gasoline Corp. Here's how the storage facilities of each of these companies fit into the picture in the Galveston Bay area:

... Warren, a subsidiary of Gulf Oil Corp., is the largest operator, with 10 storage wells, and capacity for 2,000,000 bbl. of products.

Warren is currently building a 40,000-bbl. fractionating plant at Barber's Hill to process raw mix from the Permian basin of West Texas and New Mexico. This is by far the largest fractionating plant expressly built to handle gasoline plant products.

The liquids are piped through a 530-mile line, operated by Gulf Refining Co., another Gulf Oil subsidiary. The system includes 6 and 8-in. feeder lines, and a 10-in. line from Gulf's Waddell plant in Crane County, Texas, to Barber's Hill, via Midland, Abilene, Fort Worth, and Lufkin.

Warren's underground facilities are also tied in with its Gulf Coast terminals where products can be shipped by barge or tanker.

... Bay Petroleum, a subsidiary of Tennessee Gas Transmision Co., has an underground storage capacity of 1,250,000 bbl. at its five cavities at Barber's Hill. Bay has taken over facilities of Tennessee Pipe Line Products Co., which was another subsidiary of Tennessee Gas before it was dissolved recently.

A 6-in. pipeline connects the underground storage to Bay's fractionating plant near La Porte, about 15 miles southwest of Barber's Hill. The 10,000-bbl. plant receives a deethanized mixed product stream from South Texas plants through a 6-in., 240-mile line from Agua Dulce field in South Texas.

Normal butane recovered at the plant is committed to Petro-Tex Chemical Corp. butadiene plant in Houston. A 6-in. line carries the butane to the Petro-Tex plant.

However, some of this butane is stored at Barber's Hill and drawn out to meet the fluctuating demands of the butadiene plant. The withdrawal is accomplished by reversing the 6-in.

line between the plant and Barber's Hill. When the line is reversed, it bypasses the fractionation plant and goes directly to the butadiene plant.

Bay also injects propane into its storage wells. Isobutane is sold to various customers, and the natural gasoline is shipped to Bay's refinery at New Orleans.

. . . **Texas Butadiene** operates the most unusual storage setup. The company's five storage wells, with a capacity of 1,500,000 bbl., is continually being filled and emptied. In contrast, most of the other storage facilities in the field operate on more of a seasonal basis.

The storage is closely tied in with the company's butadiene plant, 14 miles away at Lyondell. The plant receives some raw materials directly at the plant, but the major portion of receiving and storage operations are conducted at the dome.

Two 6-in. lines are used to move normal butane, isobutane, and isopentane from the storage wells to the plant. The salt dome acts as additional storage tanks would at the plant.

Plant requirements call for 8,800 bbl. of normal butane, 4,300 bbl. of isobutane, and 1,500 bbl. of isopentane daily.

. . . **Texas Natural** is the fourth operator in the field. The company was the first to begin storage operations at Barber's Hill and has three wells with about 1,000,000 bbl. capacity.

Like the other operators, Texas Natural has sufficient acreage leased for future expansion. Common practice is for operators to recover the stored products by pumping fresh water down the well for displacement purposes. This dissolves additional salt, thereby increasing capacity.

Other pipelines . . . Other pipelines are connected to Barber's Hill salt dome and contribute to the flexibility of the storage facilities. These include lines from Humble Oil & Refining Co.'s Baytown refinery and Magnolia Petroleum Co.'s underground storage at Hull Dome near Daisetta.

The most significant pipeline is the 20-in. Little Big Inch which Texas Eastern is reconverting to products. The line originates at Baytown and will carry products a distance of 1,168 miles—as far as Moundsville, W. Va.

Initial capacity of the line will be 185,000 bbl. daily. This can be increased to 250,000 bbl. daily by adding more pump stations. It will transport a full range of clean petroleum products, including L.P.G.

L.P.G. shipments on the Little Big Inch will be another stimulus to expand storage capacity at Barber's Hill and other Gulf Coast storage areas.

watching WASHINGTON

. . . with Bertram F. Linz

Importers will be heard . . .

ADMINISTRATION officials show little concern at this time over possible court action to halt the imports control program.

While those in authority are aware there may be some inequities in the allocations, companies which feel they are being treated unfairly will have a chance to tell Navy Capt. M. V. Carson their troubles. If they can prove their point, they'll get revised quotas.

The cabinet committee foresaw the possibility that some importers would protest the cutbacks and made provision to deal with it.

The committee directed the administrator to correct injustices and gave him authority to act "in such a manner as to alleviate inequities when they are found to exist, including any showing that the plan does not provide competitive opportunities for newer importers."

Since the program is voluntary, no force can be applied to make importers accept it. Officials therefore feel there is no reason for anyone to go to court at this time.

The scrip scare is no more . . .

A COLORFUL chapter in American history is drawing to a close. And the oil industry can rest easier because it is ending.

Up to some 50 years ago, when we had more land than people, the Government issued certificates, or scrip, to the public as a soldiers bonus or other reward. The scrip could be exchanged for land in the public domain.

The oil industry learned about these long-term promises a few years ago when people started digging out old scrip they had inherited or bought up and began claiming valuable producing properties off the coast of California and in the Gulf of Mexico. Owners of scrip claimed it was good for any land they chose—and oil lands were their first choice.

While this would have been a fine deal for scrip owners, it wasn't so good for operators who had spent millions developing properties to which they thought they had valid title or lease. To the relief of the oil industry, the Interior Department held that scrip wasn't good for mineral lands, and the courts concurred.

Even with this ruling, the validity of outstanding scrip was a vexing problem, and Congress decided to settle the matter. In 1955 it passed a law that scrip would be invalid if not registered within 2 years. The 2-year period ended this month.

Strangely, scrip for only about 17,000 acres of land was recorded. Nobody had known how much was outstanding, but the lowest estimate was many times that acreage. Most of the scrip, apparently, was scrapped.

Hoffa—man with a big dream . . .

KEEP your eye on ambitious James R. Hoffa. His dreams bode no good for the oil industry.

Now vice president of the most powerful union in the country, Hoffa aims to become top man in the Teamsters Union next month. He has visions of a closely-knit group of unions covering all transportation—by land, sea, and air.

Hoffa told a skeptical Senate racket-probing committee the union group would be organized only for "exchanging ideas." He denied any thought of controlling industry by cutting off its transportation.

But if his dreams come true, Hoffa would head an outfit that could bring the nation's industry, oil included, to a halt overnight.

Congress isn't likely to let him get that far. The Senate investigation, which produced Hoffa headlines last week, already has shown how a single man can dominate a union and hamstring an industry. Committee heads are certain that corrective laws will come out of the study.

In Bisti, financial success of many wells depends on four things:

1. Four Corners Pipeline. When completed, it will give area a new market and permit Bisti wells to produce normally for the first time.
2. L.P.G. Injection. Results of first trial will be known in 6 months to a year.
3. Well Spacing. It's now 80 acres, but some want 40 acres to boost production.
4. Bigger Allowables. Bisti operators say they are justified since crude goes to oil-hungry California and away from markets served by Southeast New Mexico crude.

These combine to make:

Bisti Field A Big Question Mark

FARMINGTON, N. M.—Sprawling Bisti field in the San Juan basin 2 years after discovery is still one of the industry's big question marks.

The question is this: Will most of Bisti's Gallup-sand wells pay off? Or, will the field prove a money graveyard for some operators?

Many of the field's wells certainly will make money. But many others may not.

The answer for the borderline wells likely won't come for another year. The pay will be determined by such extraneous factors as a new pipeline, secondary-recovery efforts, well spacing, and allowables.

Why the doubt? . . . The Gallup sand itself is the reason for the uncertainty.

This producing zone has proved hard and tight like Pembina field's Cardium sand which it resembles. Porosity ranges from zero to 20 per cent. Permeabilitly starts at zero and goes as high as 300 md.

Other well characteristics are:

. . . Need for fracturing most Gallup producers, although some flow naturally at rates as high as 1,000 bbl. daily. Moreover, Bisti operators think there's a trick to picking completion intervals in uncored wells. Electric logs aren't much help.

. . . Recovery is by solution - gas drive. No gas cap or edge water has been found.

Some operators studying these facts believe the trend will be a fast decline and skyrocketing gas-oil ratios. It thus could be the same story of Spraberry over again.

These sign posts have caused Bisti operators to slow down drilling programs. Most are sinking no more holes than necessary to evaluate their big lease blocks and to satisfy lease obligations.

Only 11 rotary rigs are active in the field now with about 38 active locations shut in awaiting various tests or completions. About 100 wells have been completed.

Still a good bet . . . Everyone realizes that Bisti won't be a lush bonanza. But most operators still consider it a fair investment.

Their optimism is based on these economic facts:

. . . Cost of drilling and completing a Bisti well has been cut to as little as $45,000 each. Footage contracts are going for $3.75 per foot. to the 5,000-ft. level. They were as much as $4.50 per foot only a few months ago and still are less than drilling costs in some other fields in San Juan areas or in the Paradox basin.

. . . Initial potentials are higher than for Spraberry wells. Many flow without fracturing.

. . . Lease blocks are big, most covering several thousand acres.

. . . Signs of a decline have not yet set in. This means "so far so good" because admittedly there's been very little oil taken out yet.

Bisti operators calculate that more than 20,000 acres will prove productive. Most of this area can expect to yield no more than 2,000 bbl. per acre. Down the center of the field some wells may get as much as 3,000 bbl. per acre.

While the expected 25,000,000 bbl. of primary oil isn't much for such a big pool, it's enough to make Bisti worth the gamble.

Outlet coming . . . Bisti producers expect to be selling more of their oil soon.

El Paso Natural Gas Co. buys almost all the oil now produced. The crude goes to El Paso's nearby plants for processing. But, there's so little plant capacity and so small a local market that El Paso is taking only 381 bbl. per month from each Bisti well. The only other market is the small volume of crude going for local fracture treatments.

With this low rate of production,

income has also been low. But one good thing has developed: Bisti wells have fallen very little below original bottom-hole pressure.

The Four Corners Pipeline now being built from this region to California will start changing this picture by autumn. It won't be completed until about January 1, 1958, but parts of the line will start filling in October. It will take 750,000 bbl. to fill the line.

Another benefit is expected from the pipeline. It will mean that Bisti oil and other Four Corners crude won't compete in the same market with oil from the Permian basin fields of Southeast New Mexico. For that reason, Bisti operators expect their allowables will be based on the demands of their own market rather than conditions of other markets. The result thus could be higher allowables.

The New Mexico Oil Conservation Commission, however, hasn't made any public statements on this point.

What spacing? . . . The issue of spacing in Bisti likely will come before the conservation commission for a showdown soon.

Uncertainty about the Gallup sand thus far has kept Bisti operators on 80-acre spacing. Shell Oil Co. and others think 40 acres would be better, although they are adhering to the 80-acre pattern at present.

These advocates of 40-acre spacing claim added recovery would justify the extra drilling cost. But most operators would rather wait for more production history before going to the 40-acre pattern.

The more cautious operators also would like to see how Sunray Mid-Continent makes out with its L.P.G.-injection project. Sunray, in partnership with Phillips Petroleum Co. and British-American Oil Producing Co., has completed its first gas injection well at Bisti. The company soon will start injecting L.P.G. into the Gallup.

Sunray engineers believe they may more than double primary recovery by injecting L.P.G. If so, 40-acre spacing almost certainly will follow. How soon the project will show results depends on how fast the offset can be produced. This in turn depends on allowables and completion of the pipeline. No one expects any kind of results sooner than 6 months.

Other companies, meanwhile, are considering water-injection projects for Bisti. There's doubt, though, that all secondary-recovery projects will pay their way in extra oil. Its hardness and tightness make the Gallup sand a question for secondary recovery just as it does for primary recovery.

Sunshine Wildcat Passes Tests

OCEAN CITY, Wash. — Sunshine Mining Co. last week staked location for three offsets to its much publicized 1 Medina wildcat and continued production tests on the apparent discovery.

Tests thus far indicate the 1 Medina is a good producer, the first commercial well for the State of Washington.

Company reports say the well flowed 140 bbl. of oil in 15 hours on its latest test with total daily potential of about 220 bbl. at tubing pressure of 250 psi. An earlier test had put the potential at about 180 bbl. daily, but company officials said this was regarded as too low.

Two 10-hour tests earlier gave these results: Flow of 86 bbl. of crude through ½-in. choke and 75 bbl. on ¼-in. choke. After being shut in 8 hours casing pressure was 1,500 psi. and tubing pressure 1,400 psi.

The well is completed in the second of three Nye zones found in the 4,130-ft. wildcat. For completion, four holes per foot were shot in the interval 3,952-58 ft.

The 1 Medina was blown to the sump last week for benefit of dignitaries, including Washington's Gov. Albert D. Rosellini. It was allowed to flow for 8 minutes and produced a steady 2-in. stream. Then the oil was turned to tanks. The well had been shut in 24 hours prior to the test.

The wildcat is located near four earlier tests which were abandoned. These all had shows, and one produced some crude on an 8½-hour test. Sunshine officials say they will know for sure within 60 days if the 1 Medina is a commercial producer. They estimate 100-bbl.-daily production will put it in that class.

Sunshine still has not negotiated a crude sales contract. The well will be shut in when present limited storage facilities are filled until a market is found. The three offsets are in a straight vertical line. The first offset will be spudded by mid-September.

Drilling Firm, Production Sold

SAN FRANCISCO. — Major organizational changes have occurred in the Westates Petroleum Co.

The company has acquired control of Arrow Drilling Co., Tulsa, and Hamilton Dome Oil Co., Ltd.

Westates itself has been purchased by American and Canadian oil and financial interests, but details of this transaction have not been announced. H. W. Thompson, the newly elected president, says information will be made public after stockholders are notified.

The reorganized company has elected a 10-member board of directors and new officers. Thompson, a Los Angeles independent oil operator and drilling contractor, was named president. D. L. Edmiston, Tulsa, president of Arrow Drilling, was elected a director of Westates.

Edmiston said his firm now is a subsidiary of Westates, but there will be no personnel changes. The new relationship will strengthen both Arrow and Westates, he said. Crude-oil reserves estimated at 30,000,000 bbl. are held by Westates.

Westates has been producing crude and natural gasoline in California, New Mexico, and Wyoming. Under a new arrangement, it has acquired control of Hamilton Dome properties in Wyoming, part of which had been owned by Indian Oil Co. and General American Oil Co. Previously Westates held a one-half interest.

In another reorganization decision, the directors merged two Westates subsidiaries—Westates Petroleum of Nevada and Westates Petroleum Corp. of Texas—into the newly acquired Hamilton Dome Oil Co., Ltd.

The Hamilton Dome subsidiary also will develop new properties acquired in East Texas, West Texas, Oklahoma, and western Canada from Canadian British Empire Oil Co., Ltd.

Directors . . . The new board of directors, in addition to Thompson and Edmiston, consists of the following:

Gen. Frederick L. Anderson, Palo Alto, Calif., a director of U. S. Leasing Corp.; Henry R. Benjamin, New York City, director of Virginian Railway Co.; Cecil Chesher, Calgary, geophysicist; John P. Ohl, New York City, a partner of Cahill, Gordon, Reindel & Ohl; John S. Davidson of Vancouver, director of oil and mining companies in western Canada; George J. Darneille, Houston, vice president of Brown & Root, Inc.; Robin F. Scully, Beatrice, Neb., independent oil operator; Lee Van Atta, Dallas, assistant to the president of Three States Natural Gas Co., and an independent oil operator.

Pneumatic drills punch holes through rock layer . . .

for a series of blasts . . .

Then the back hoe clears out rubble . . .

to form pipeline ditch 5 ft. deep.

Pipeliners Blast Way Through Rocks

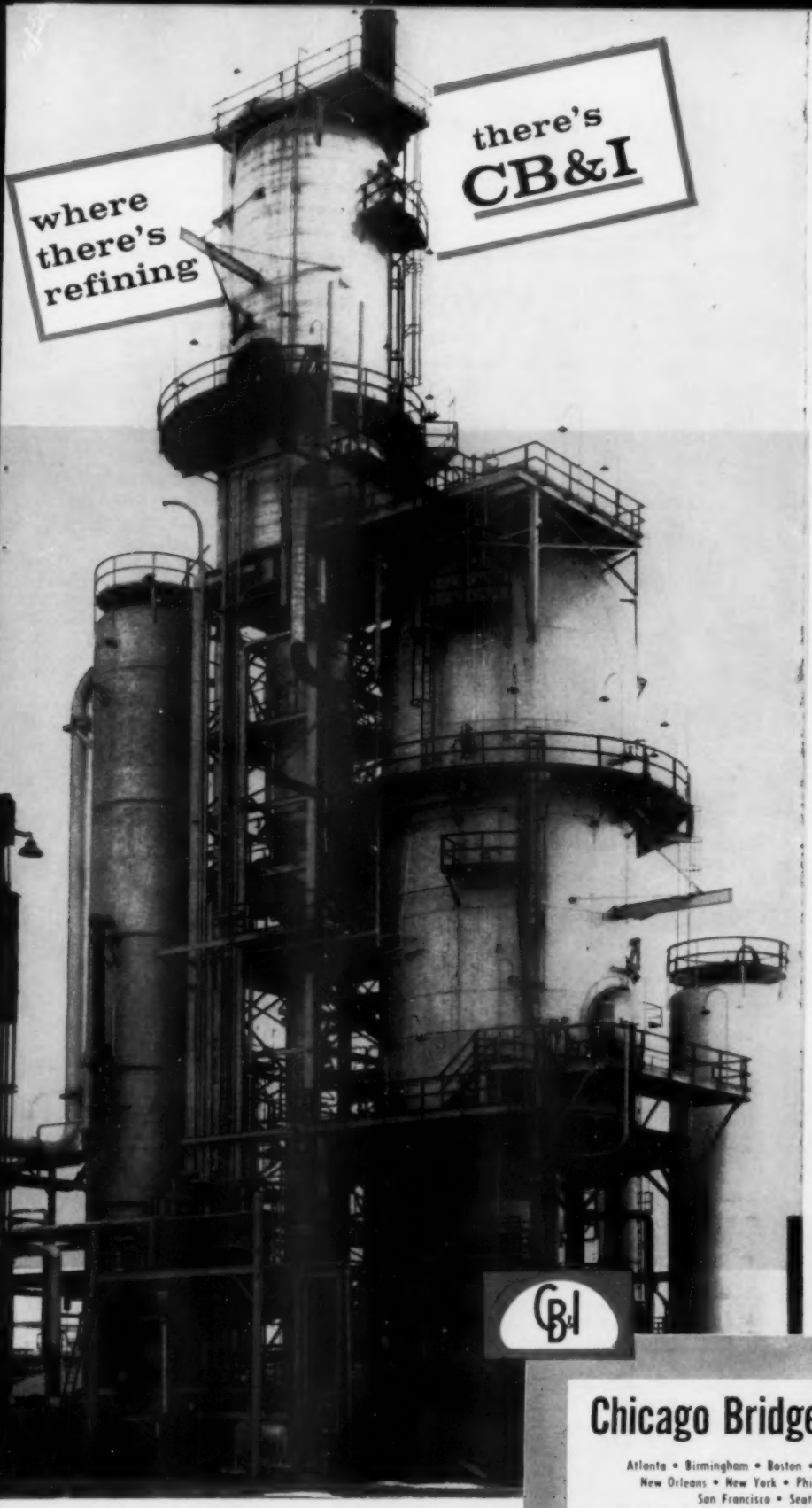
LAYERS of rock in the rough country of southeastern Utah are minor obstacles to ditching crews working on Four Corners Pipe Line.

When the ditching machine hits a stretch of rock, a pair of pneumatic drills borne by side-boom tractors quickly punch holes for explosive charges. Following the blast, a back hoe cleans the ditch to the desired depth of about 5 ft.

In sandy sectors along the 650-mile right-of-way, ditchers work at near-maximum speed.

Sandy stretches and rocky areas alternate across the desert country between the San Juan River and the Utah - Arizona border, where A. P. Vaughn Construction Co. and Potashnick Construction Co. have started work on the line. When completed, the 16-in. pipeline will move crude oil to refineries in the Los Angeles area.

Shell Pipe Line Corp. is supervising construction for the recently formed Four Corners Pipe Line Co. Standard Oil Co. of California and Shell Oil Co. each has a 25 per cent interest in the new line. Other owners are Gulf Oil Corp., with 20 per cent interest, and Continental Pipe Line Co., Richfield Oil Corp., and Superior Oil Co., each with 10 per cent.



Above: UOP fluid catalytic cracking unit recently fabricated and erected by CB&I at the Detroit refinery of Aurora Gasoline Company.

ANOTHER UOP FLUID "CRACKER" FOR AURORA

This new UOP-type fluid catalytic cracking unit was fabricated in our Chicago plant and erected by CB&I at Aurora Gasoline Company's Detroit, Michigan refinery.

Its predecessor, recently dismantled at Detroit and re-erected by CB&I at Aurora's refinery in Muskegon, Michigan, was the *first* UOP Univesseltype fluid cat cracker.

Aurora Gasoline Company is an independent firm which has expanded constantly and with notable progress since their formation in 1932. In that time they have repeatedly taken advantage of the facilities for design, fabrication and erection of petroleum processing and storage structures offered by CB&I.

Whether *you're* building new or expanding, see CB&I *early* in your refinery planning. Write our nearest office for further information.

P58CB

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
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Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.
REPRESENTATIVES AND LICENSEES:
Australia, Cuba, England, France, Germany, Italy, Japan, Netherlands, Scotland
SUBSIDIARIES:
Horton Steel Works Limited, Toronto, Chicago Bridge & Iron Company Ltd., Caracas,
Chicago Bridge Limited, London, Sociedade Chibridge de Construcoes Ltda., Rio de Janeiro.

Import-Control Plan Faces First Test

WASHINGTON. — The new import-control program gets its first test next week when hearings open on protests from importers against their initial voluntary quotas.

The Texas Railroad Commission indicated, meanwhile, that importers are continuing record-level oil movements into this country through August (see table below). Imports probably won't start declining until September.

The commission figures put July imports at 1,104,100 bbl. daily, a new record. August estimates are 1,206,300 bbl. daily, even higher, and September will see 1,123,800 bbl. daily brought in.

The hearings at the capital next week have one purpose: Iron out alleged inequities in the quotas. This is required in the cabinet committee's report setting up the voluntary plan.

Rules under which import controls will be applied were written last week by Navy Capt. M. V. Carson, Jr., administrator of the program. They provide that any importer who feels he has been dealt with unfairly may argue the point in public hearings.

The hearings may run through the greater part of September. A number of companies already have asked to be heard. Others are expected to file requests as a result of Carson's blanket invitation.

Each company will be heard separately. The companies themselves, rather than Carson, will fix the date for their appearance.

Carson will direct the hearings personally. He will be assisted by representatives of the Justice Department, Office of Defense Mobilization, the Office of Oil and Gas, and the Interior Department solicitor.

The rules worked out by Carson give Interior Secretary Fred A. Seaton the final voice in any revision of quotas which may result from the hearings.

First Reports Since the Imports Order

(Thousands of barrels daily)

	—Actual*—		—Estimated or forecast†—				
	July	July	Aug.	Sept.	Oct.	Nov.	Dec.
CRUDE—EAST COAST:	1956	1957	1957	1957	1957	1957	1957
Atlantic Refining Co.	70.2	66.3	61.9	61.9	61.9	61.9	61.9
Cities Service Co.	36.3	30.9	34.9	31.8	34.2	31.2	32.6
Eastern States Pet. Co.	17.0	12.4	23.8	30.5	26.5	26.5	26.5
Gabriel Oil Co.	6.3	...	7.1	7.3	7.1	7.3	7.1
Gulf Oil Corp.	149.0	153.0	135.0	111.0	104.0	104.0	104.0
Hancock Oil Co.	1.7	(††)	(††)	(††)	(††)	(††)	(††)
Lake Superior	5.5	(††)	(††)	(††)	(††)	(††)	(††)
McBride Oil & Gas Co.		(††)	(††)	(††)	(††)	(††)	(††)
Phillips Petroleum Co.	9.8	11.7	11.6	12.0	11.6	12.0	11.6
San Jacinto Pet. Co.	1.6	(††)	(††)	(††)	(††)	(††)	(††)
Signal Oil & Gas Co.	1.6	...	...	...	...	...	...
Sinclair Oil Corp.	86.4	64.5	85.6	72.2	72.4	73.3	79.6
Shell Oil Co.	1.0	...	0.2	...	5.0	5.0	5.0
Socony Mobil Oil Co., Inc.	69.2	73.8	83.6	72.2	70.4	70.4	70.4
Sohio Petroleum Co.	1.2	...	7.5	7.5	9.0	9.0	9.0
Southwestern O. & R. Co.	...	3.6	...	3.8	...	3.8	...
Standard Oil Co. of Calif.	85.1	70.8	70.7	70.7	70.7	70.7	70.7
Standard Oil Co. (Ind.)	17.5	27.0	58.2	58.6	58.3	55.6	54.6
Standard Oil Co. (N. J.)†	89.0	77.0	83.0	83.0	61.0	61.0	61.0
Sun Oil Co.	55.7	61.0	59.6	66.3	54.9	55.4	52.4
The Texas Co.	88.3	68.1	74.3	60.5	36.9	47.0	40.4
Tidewater Oil Co.	26.0	72.1	114.2	94.6	81.4	72.8	77.8
Total East Coast	818.4	792.1	911.2	843.9	765.3	766.9	764.6
CRUDE—WEST COAST:							
Douglas Oil Co. of Calif.		(††)	(††)	(††)	(††)	(††)	(††)
Shell Oil Co.	3.9	73.7	62.8	61.8	45.7	42.0	62.1
Socony Mobil Oil Co., Inc.	27.7	26.0	26.5	26.5	26.5	26.5	26.5
Standard Oil Co. of Calif.	27.3	57.7	65.2	65.2	65.2	65.2	65.2
The Texas Co.	45.9	34.2	37.7	35.2	35.5	40.0	40.2
Tidewater Oil Co.	47.3	58.9	58.1	46.4	55.2	41.1	50.6
Union Oil Co. of Calif.	14.7	24.2	14.0	14.0	14.0	14.0	14.0
Wilshire Oil Co.	24.0	37.3	30.8	30.8	30.8	30.8	30.8
Total West Coast	190.8	312.0	295.1	279.9	272.9	259.6	289.4
Total crude	1,009.2	1,104.1	1,206.3	1,123.8	1,038.2	1,026.5	1,054.0
PRODUCTS:							
Asiatic Petroleum Corp.	2.8	7.0	7.3	4.4	4.5	7.7	4.3
Eastern States Pet. Co.	11.4	5.2	3.0	3.0	3.0	3.0	3.0
Gabriel Oil Co.	0.5	...	...	...	...	...	...
Gulf Oil Corp.	12.0	4.0	10.0	10.0	9.0	10.0	9.0
Shell Caribbean Pet. Co.‡	69.0	122.0	132.0	152.0	165.0	162.0	231.0
Shell Oil Co.	21.7	14.6	27.3	23.3	20.6	21.3	20.6
Socony Mobil Oil Co., Inc.	10.6	13.8	9.3	9.3	9.3	9.3	9.3
Standard Oil Co. of Calif.	6.0	10.9	14.0	14.0	14.0	14.0	14.0
Standard Oil Co. (Ind.)§	18.6	6.0	21.7	25.5	21.1	32.9	38.6
Standard Oil Co. (N. J.)†**	114.0	175.0	177.0	177.0	256.0	256.0	256.0
The Texas Co.	4.3	...	4.3	...	6.5	6.7	6.4
Total products	270.9	358.5	405.9	418.5	509.0	522.9	592.2
Total crude and products	1,280.1	1,462.6	1,612.2	1,542.3	1,547.2	1,549.4	1,646.2
Bonded fuel included‖	89.0	102.5	99.8	95.9	93.7	97.2	93.5

*From company reports to the Texas Railroad Commission. †Based on quarterly estimates. ‡Imported by independent distributors. §Received through suppliers who can furnish either domestic or foreign oil. ‖Mostly duty free for bunkering ships in foreign trade. **Includes bonded drawback for foreign flag international bunkers as follows: July, 52,000 bbl. daily; third quarter, 52,000 bbl. daily; fourth quarter, 51,000 bbl. daily. ††Did not report to the commission.

Persuasion . . . Carson, meanwhile, met last week with officials of Sun Oil Co. in an effort to convince them there is no ground for fears that the program violates antitrust laws.

It was on this ground that Sun declined to accept the program, although it said it was planning to cut back its imports.

Carson is convinced the program has no antitrust complications. Other government officials point out there is evidence to sustain his position. They explain the importing companies:

. . . **Are not asked to agree** among themselves upon any plan of action. Each is working in cooperation with the Government.

. . . **Had no voice** in working out the quotas. These were drawn up by an agency of the Government.

In addition, cabinet committee meetings where the program was discussed were attended by representatives of the Justice Department. The department, which made no objection to efforts of former Mobilization Director Arthur S. Flemming to apply a voluntary program, has shown no opposition to the latest plan. And department representatives will partici-

pate in the hearings on importers' protests.

Newcomers . . . Carson's rules also cover the problem of new importers.

To provide a share of the market for the newcomers, Carson is asking them to submit their import plans at least 6 months before they become effective.

At the same time, he asked that importers in District 5 also submit their programs. No limitations are now proposed for that area, but the cabinet committee wants to watch developments there.

Importers now have been supplied with forms on which to make monthly reports of imports and future schedules. The reports will show the average daily receipts of both crude oil, unfinished oil and topped crude by each refinery, and country of origin. They also will show planned imports for the succeeding 5 months.

The first report will cover the first two quarters of this year and the month of July. Subsequent reports are to be filed by the fifteenth of each month.

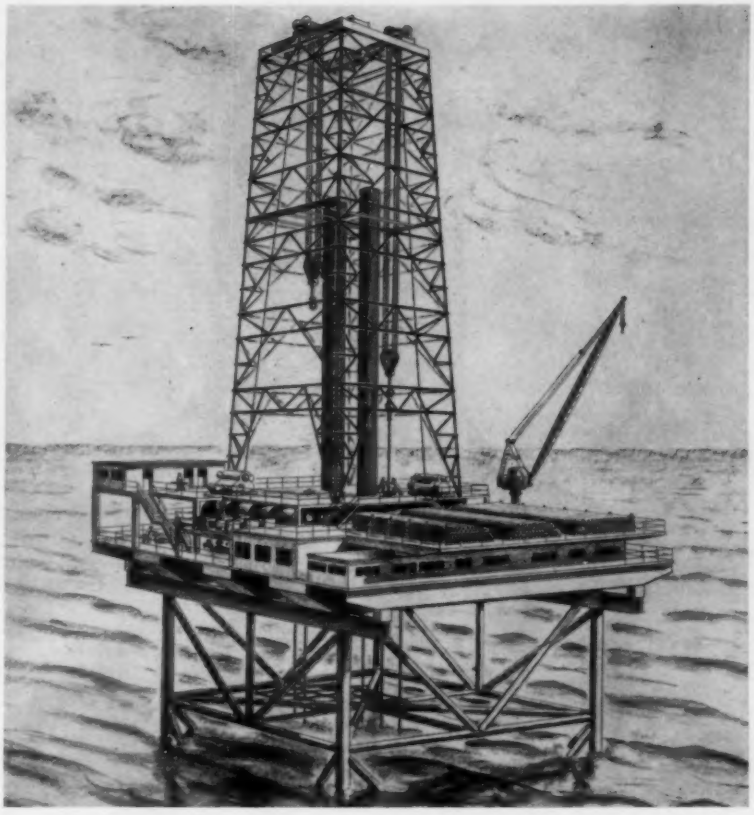
Since the program is based on imports over the 12 months beginning with July, Carson said he does not expect any definite downward trend will be shown before September. In the case of companies protesting their quotas it may be even longer.

Meanwhile, a big question in Washington is: What will the administration do if an importer refuses to go along with the program? Since the controls are voluntary, the Government has no means of enforcing them other than through pressure of public opinion.

But public opinion in this case may not be enough for the Government. Consumers are more interested in prices. They have been told that import controls will result in higher prices for gasoline. In some quarters it is predicted that the public is more likely to oppose than favor the control program.

Interior officials say that if the voluntary program fails the only possible step then is for the President to impose mandatory controls. He will be required to do this, they say, because the problem already is officially before him in Flemming's certification that imports threaten the national defense.

Beyond the White House lies Congress. Officials don't want to talk about what might happen there if the program falls down. But some say privately that Congress might find it difficult to pass a quota bill in an election year in the face of opposition from consumers.



Core-holes lead to California's first platform as . . .

Socal Gears for Offshore Hunt

LOS ANGELES. — Standard Oil Co. of California will sink another $2,000,000 into its Summerland wildcat lease when it builds the West Coast's first offshore drilling platform next year.

The big drilling island will house the first test on a $7-million, 5,500-acre state block off the coast of Summerland northwest of here. The lease has been held jointly by Socal and Humble Oil & Refining Co. since last January.

While Socal has never released results of recent core-holes drilled earlier this year, chances are the cores were good. The big multiwell platform is a pretty fair indication.

The drilling platform will run the companies' investment in the tract close to $10,000,000. In addition to the $2,000,000 cost of the platform and $7,250,000 paid for the lease, Socal and Humble paid several thousand dollars daily rental for a core boat to test the lease.

The platform will be equipped to drill up to 25 wells—two at a time. The 110-ft. square deck will stand 50 ft. above water.

Drilling will be done with a 140-ft. derrick. When the drilling program is completed, the derrick and auxiliary equipment will be removed.

Camouflage . . . The platform will be 2.2 miles offshore from Loon Point south of the town of Summerland in Santa Barbara County. Water depth in that area is about 100 ft.

It will be painted a subdued color with nonreflecting texture to blend with the seascape. To find out how the platform will look from shore, Socal anchored a small vessel at the proposed site, checked its visibility from various points ashore.

The go-ahead . . . Socal and Humble received permission to build the platform earlier this month (OGJ, Aug. 19, p. 97). It's the first permit for an offshore platform under the 1955 Shell-Cunningham Act.

This act opened southern California offshore tracts to wildcat operators. Although the Socal-Humble block is just offshore from Summerland field, state does not consider the tract on the Summerland structure.

Exotic Scenery Routine For This Crew

LOS ANGELES.—A new Sahara Desert wildcat?

Not at all . . . guess again.

It's Universal Consolidated Oil Co.'s second soundproofed rig now working on its lease at 20th Century Fox' movie lot in west Los Angeles.

One thing the drillers can't complain about on this well, 1A Community, is monotonous scenery. To the east (pictured above) is a French Foreign Legion fort. To the west is a headquarters building for a German Army unit. To the south is an acre of dense jungle foliage, all on wheels for easy movement, and to the north is a quaint stone chapel.

This scenery often is enchanced by an occasional glamorous movie star en route to a set on some other part of the lot.

Actually, this is all old hat to most of the Sun Drilling Co. crew on the rig. Sun has been operating another rig for Universal Consolidated on the movie lot about ¼-mile east of this one for several years now.

Universal Consolidated crew last week was drilling ahead on 1A Community below 2,566 ft. This well is being slant drilled to a 40-acre block Universal has in the town lot area of west Los Angeles adjoining the movie lot to the west.

Sohio's 2-Month Strike Ends

CLEVELAND.—The oil industry's biggest labor strike of the year has been settled after more than 2 months of negotiations and court action.

Standard Oil Co. (Ohio) and Oil, Chemical, and Atomic Workers International Union have agreed to a 6 per cent wage increase which first touched off the strike last June 7.

The union dropped its demands for retroactivity on the wage hike. The pay boost goes into effect as the workers return to the companies five refineries in Cleveland (two), Toledo, Lima, and Covington, Ky. The plants have a total capacity of 140,000 bbl. daily.

In July the company refused to accept an outside umpire whose decision would be binding because company officials said the main issue was not really wages but company-wide bargaining. As in the past, bargaining was carried out on a local basis.

In the new agreement with the union, Sohio dropped its $856,000 damage suit against O.C.A.W. for illegal picketing at the Toledo refinery. The union has agreed to pay a substantial amount of money to the company.

At the Lima refinery, workers began returning to work earlier this month without a contract between Sohio and O.C.A.W., which has been representing the Lima workers. The National Industrial Workers Union notified the company that it represents the Lima plant. The issue is expected to be settled through a National Labor Relations Board election.

—*Processing* briefs

Steelman Gas, Ltd., formerly Provo (Sask.), Ltd., has been granted a permit by the Saskatchewan Department of Mineral Resources to build a $20-million processing plant northeast of Estevan to gather, process, and transmit casinghead gas in the Steelman area. The project, to be completed by September 1958, will process the gas into propane, butane, gasoline, sulfur, and dry residue gas. Flaring now exceeds 17,000,000 cu. ft. daily. Residue gas will be sold to the Saskatchewan Power Corp. for its gas distribution system.

Construction will begin immediately on a project to double capacity of the Baytown, Tex., sulfur-recovery plant owned by Consolidated Chemical Industries Division of Stauffer Chemical Co. The new units should be on stream early in 1958.

Wainwright Producers & Refiners, Ltd., has awarded an engineering contract for a 3,000-bbl. thermal cracker and a 1,000-bbl. Platformer at its Wainwright, Alberta, refinery to Ralph M. Parsons Co., Los Angeles.

A 10,000-bbl. combination U.O.P. Platformer and Unifining unit has gone on stream at Wilshire Oil Co.'s 30,000-bbl. Norwalk, Calif., refinery. The Unifining unit is pretreating Kuwait and California-derived naphthas for feed to the Platformer, equipped with a rerun column and designed to produce a 100 leaded-octane blending component for premium gasoline.

Also for Refiners . . .

Barber's Hill salt dome has become world's largest underground L.P.G. cavern and key cog in Houston's petrochemical complex (p. 72) . . . Imports still high for July and August, may head down in September (p. 78) . . . Two-month strike finally ends, reopening Sohio refineries (p. 80) . . . National Petro-Chemical is planning new polyethylene plant on Gulf Coast (p. 87).

PLUS THESE TECHNICAL FEATURES: Atomic experiments develop radiation-resistant lubricants (p. 97) . . . How Cosden juggled its pumps to keep up production during catcracker expansion (p. 98) . . . How P.C.I. removed bottlenecks to expansion of butadiene (p. 102) . . . PETROdatics (p. 127) . . . The Forman's Page (p. 128) . . . and Questions on Technology (p. 129).

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This aerial photo of rough country at Aneth shows why .

Four Corners Travels by Air

CORTEZ, Colo. — If you drive your own car in the Four Corners area, you will get from 20 to 35 cents mileage. But the money you get and the time you lose are causing oil companies to replace cars with airplanes in this rugged new oil country.

Rough terrain and lack of roads and bridges have created monumental problems for the developers of Aneth field in Southeast Utah.

Adding complication to the lack of roads is the San Juan River. There are no bridges across it between Shiprock, N.M., and Mexican Hat, Utah, a distance of about 100 miles. And, unfortunately, the San Juan cuts the Aneth area in half.

It's easy to throw a rock across the San Juan or to wade across, but fording it with heavy equipment is impossible. As a result, two rigs drilling offset locations across the river from each other might be 200 miles apart by car. Thus, a contractor with rigs on both sides of the river has extra problems.

Operators are turning to air travel because:

. . . **Crews can be flown to** remote rigs daily cheaper than they can be housed in camps at the rig sites.

. . . **Poor roads make cars** more expensive to keep up than air travel.

. . . **Time saved in air travel** is money saved, particularly on rig breakdowns.

. . . **Fast, easy travel by air** is good for morale.

Public roads in the Four Corners area are few, and what there are of them are rough, twisting, and hilly. Heavy trucking keeps them torn up. Most of the distance to active oil areas must be covered on bulldozed trails, and the terrain alternates between deep, loose sand and big rocks.

Broken springs, blowouts, and body rattles are common on cars in the area. Good travel time in some places is 15 miles per hour. Accidents are numerous.

Companies find themselves paying not only 20 to 35 cents per mile but also losing valuable work time.

With planes, no camp . . . The big reason for using planes instead of cars is the saving of cold cash. It's cheaper to fly a crew to work each day than to set up a camp in the field. It's cheaper to rent a plane and fly to the field than it is to drive.

Most geophysical companies have camps in the Four Corners area because they already have the camp equipment and can't afford to let it sit idle. It's almost certain, however, these companies will turn to planes rather than replace equipment.

One geophysical company is now flying 15 men to work and back each day at a cost of $175. Two 4-man drilling crews, each working 12-hour tours, can be flown to the rig daily for $75 per day. To equip and house such crews in a field camp would cost double the flying costs.

Drilling contractors who are now paying high mileage for personal cars of drilling crewmen say that for very little more they could work the crews 12 hours and fly them back and forth. And, because of the long driving time, crews would be gone from home only slightly longer than when working 8 hours.

On the star route . . . When the oil companies discovered how expensive cars are in this rough country, they were only finding out something Uncle Sam already knew. It is here that the Post Office Department contracts for the only overland aerial star-mail route in the country.

The air-borne mail carrier started operating between Cortez and White Canyon, Utah, in 1951. Service includes not only air mail but first class and everything else, including mail-order catalogs. The arrangement has been profitable for both postal service and the flying company.

Tool pushers who rent planes in Cortez can make a round trip to Aneth for about $12. Flying time is less than an hour. At 25 cents per mile, the same trip would cost $25 by car and would take 3 to 4 hours. A company-owned plane should fly for as little as 8 cents per mile if flown more than 500 hours per year.

There's always a landing spot within a mile or so of the rig and bad flying weather is only a problem less than 15 days a year.

Main supply center for the Four Corners area is Farmington, N.M. By car, Farmington is 120 miles from much of the Aneth play, and driving time one-way is 3 to 4 hours. "Hot-shot" service on equipment costs $75 by pickup truck. The same trip by plane costs only about $35 and takes an hour. Considering down time on a drilling rig, the saving with a plane would be even greater.

Good for morale . . . Another big reason for using the time-saving planes is the morale of the people involved. There's plenty of work in the Four Corners for rig crewmen. So, for them, it's a big temptation to look for another job rather than go to a camp.

Airplanes do a lot of ambulance work, too. Several men injured in the field owe their lives to swift air travel to a hospital.

More Pipeline Proration

September's 13-day schedule in Texas too high for some big buyers including Gulf, Magnolia, Atlantic, and Sun

AUSTIN.—Further pipeline proration of Texas crude production has already set in following the September allowable boost ordered by the Texas Railroad Commission in mid-August.

The commission held fast to the all-time low-producing schedule of 13 days originally adopted for July and carried over into August.

But July and August were 31-day months. The 13-day order for next month, when distributed over only 30 days, will mean a calendar-day allowable of 3,127,506 bbl. daily.

This is a hike of 59,623 bbl. daily above the initial allowable for August, and a 91,703-bbl. daily increase over the allowable in effect August 3.

The commission's decision coincided with the wishes of most of the purchasers. But the September figure will be far too high for a few, including such large buyers as Gulf Oil Corp., Magnolia Petroleum Co., Atlantic Refining Co., and Sun Oil Co.

Cut urged . . . Gulf argued strenuously for only 10 producing days—not only for September but for the last half of August. The latter would have called for an amendment of the August allowable order.

Gulf, already prorating in five other states, testified it has filled nearly all its own storage and all of the 2,750,000 bbl. of tankage it had been able to rent. The company's oversupply of crude is running at about 35,000 bbl. daily.

Gulf said it would have no choice but to prorate in Texas down to a 10-producing-day supply if the commission failed to set the allowable at this level. A state-wide 10-day schedule would have meant an allowable cut of 391,588 bbl. daily for September from August 3. Gulf carried out this cutback effective August 17.

Sun Oil slashed its original 13-day nomination for September down to 11 days at the hearing "because of the loss of a substantial market for refined products requiring a drastic cut in refinery runs."

Atlantic's storage position is getting tight, and even on a 12-day pattern to October 1 the company said it would be looking at full storage everywhere. Atlantic originally nominated 12 days. But a company spokesman here said he had just been advised the firm's Philadelphia refinery was cutting runs 16,000 bbl. daily, and that this definitely would further depress Atlantic's demand for Texas crude next month.

Magnolia could lift proration if a 10-day schedule were adopted for September. The company, which already had been prorating at 85 per cent of May runs, told the commission it currently is taking still another 4 per cent under this amount.

Lease loss threatened . . . Meanwhile, independent producers testified to a worsening producer situation in the Texas Panhandle. Woodson Oil Co., M. A. Machris, and others said they had been able to sell no oil at all in July and August—even when offering to truck it to purchasers' plants or pipelines.

Primary term of the affected leases has expired, they said, and unless some oil can be sold soon the leases may revert. The leases are also jeopardized by continuous drilling clauses in the lease agreements.

ALLOWABLES BY DISTRICTS
(Barrels daily)

District—	September	Inc. from August 3
1—Southwest	58,971	1,158
2—Gulf Coast	134,725	4,303
3—Gulf Coast	437,717	9,201
4—Southwest	225,479	5,902
5—East Central	38,736	967
6—Outside E. Texas field	133,632	3,872
6—East Texas field	178,505	4,172
7-B—North Central Texas	189,476	5,135
7-C—West Central Texas	163,313	6,445
8—West Texas	1,136,985	44,817
9—North Texas	279,872	4,257
10—Panhandle	150,095	1,474
Total	3,127,506	91,703

Gas drive, water floods approved:

Texas Projects To Hike Output

AUSTIN.—Three more large secondary-recovery or pressure-maintenance projects in Texas have the go-ahead from the Texas Railroad Commission.

Continental Oil Co. and Cities Service Oil Co. will launch new projects in West Texas, and Quintana Petroleum Corp. will carry out a pilot water flood in the Gulf Coast area.

. . . Continental will flood the Yates sand under its Settles leases in Howard-Glasscock field of Howard County. The company expects to hike its oil take from the shallow 1,300-ft. zone to almost 9,208,000 bbl.—about 63 per cent of oil in place. This is more than double an estimated 3,788,000 bbl. recoverable by primary methods.

The flood will affect 488 acres and 43 Yates wells. The pool was discovered in May 1956, and in the first year produced 1,640,000 bbl.

A modified five-spot flood pattern will be used to inject produced water from the Yates through a closed system. Thirteen producers will be converted to input wells, and four more inputs will be drilled.

. . . Quintana's pilot water flood will be carried out in the 5,500-ft. sand of Tom O'Connor field in Refugio County. The company convinced the commission that pressure maintenance is a must in the 20-year-old field to keep from losing as much as 20 per cent of the oil because of migration into a water column.

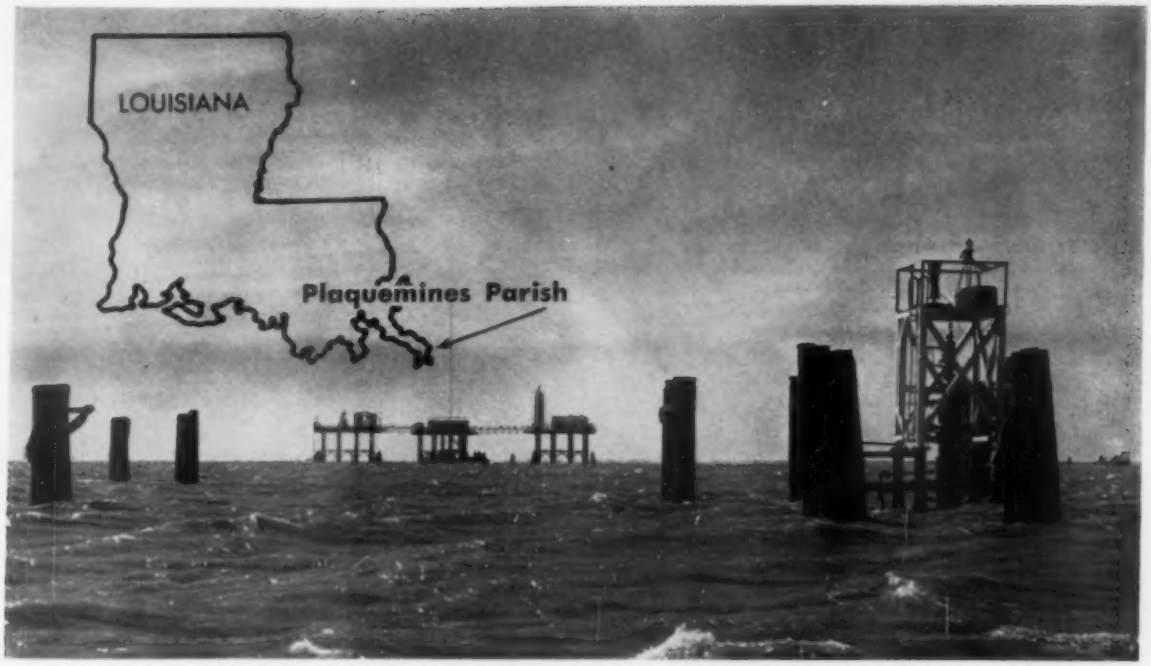
Quintana said the flood will affect all the field's 5,205 acres. The company estimates the project will cut residual oil saturation at abandonment from 45 per cent of pore space (without pressure maintenance) to about 30 per cent.

Since discovery in October 1937, the field had produced 4,108,188 bbl. to May 1 of this year. Quintana says pressure has dropped 8.6 per cent of the original while the zone has given up only 2 per cent of the original oil in place. The company thus indicated that the field initially held about 200,000,000 bbl. of oil.

The plan calls for injection of 2,000 bbl. of formation water daily into the pay zone, 100 ft. below the oil-water contact. Three inputs will be used initially.

. . . Cities Service will inject gas in the 7-C reservoir of Columbus field in Colorado County, West Texas. The company expects to net an added 2,000,000 bbl. of oil, boosting estimated primary recovery from the pool by more than 45 per cent.

The 7-C sand produces from about 8,350 ft. in the Wilcox formation. It has 15 wells in a unit approved by the commission in June 1955. The unit area had produced 533,920 bbl. of oil as of June 1.



Louisiana's biggest field is Block 24 in Plaquemines Parish, where . . .

Wildcatters Give the Odds a Beating

● **Plaquemines boasts one of the country's best success ratios: 27 per cent of all wildcats drilled during the first half of 1957 were successful.**

NEW ORLEANS.—Louisiana's Plaquemines Parish, already one of the country's most prolific oil areas, continues to be a favorite hunting ground for wildcatters.

There's good reason, too, for the success ratio of wildcats in Plaquemines Parish is far better than average in a state famous for its high discovery rate. Not only are the chances of finding oil good, but the chances of finding really big oil appear at least fair.

Plaquemines Parish, a long finger of lowlands and water bottoms, extends south of New Orleans more than 80 miles down the Mississippi River and out to the state boundary under the Gulf of Mexico.

It covers some 984 sq. miles. There are few areas of comparable size anywhere in the United States which have been more intensively drilled.

Yet wildcatters keep flocking to this marshy county along the lower Mississippi. And they keep finding more oil every year. During the first half of this year there were no fewer than six oil or gas discoveries chalked up in Plaquemines. They represent nearly one-sixth of all discoveries in the entire state during that period.

Two major developments of recent years in South Louisiana have tended to spur continued exploration in Plaquemines:

. . . **Recent deep discoveries** have opened an entirely new horizon for exploration even though the country's surface has been scratched repeatedly by shallow wells.

. . . **Discovery of several** important fields just offshore near the mouth of the Mississippi has extended the Plaquemines play into the Gulf of Mexico.

Of the two developments, the offshore play has been the more profitable so far. Offshore fields have been largely responsible for boosting Plaquemines oil production from 23,000,000 bbl. in 1950 to more than 68,000,000 bbl. in 1956.

Big reserves . . . South Pass Block 24 field, which is almost entirely offshore, now ranks as the largest oil field in Louisiana. As of the first of the year its proved reserves were estimated at more than 278,000,000 bbl., a total exceeded only by half a dozen fields in the entire country.

Shell Oil Co., principal operator in South Pass field, has an elaborate gathering system connecting its producing wells in Block 24 (see photo).

Latest production figures from the Louisiana Conservation Department show that Shell had 91 producing oil wells and two condensate wells in the field in June. During that month they produced 777,355 bbl. of crude and 1,358 bbl. of condensate.

The California Co., with 156 wells, followed with 570,247 bbl. of crude production. The Texas Co., with nine wells, and Hassie Hunt Trust, with one well, boosted crude production in June to 1,398,994 bbl. for a daily average of more than 46,000 bbl.

At midyear Block 24 field had 359 producing wells. Of that total, 173 were added during the preceding 8 months. The field is now producing about 70 per cent more oil than Caillou Island, its nearest rival in the state.

Giant fields . . . Though Block 24 field is the largest, it is only one of several major fields in Plaquemines Parish. Louisiana has 26 "giant" oil fields, having remaining reserves esti-

mated at 100 million barrels or more.

Six of these are in Plaquemines Parish. They are South Pass Block 24, Lake Washington, Venice, Main Pass Block 69, Grand Bay, and Quarantine Bay.

Plaquemines Parish produces about 78 per cent as much oil as New Mexico, which is rapidly becoming a major producing state. In 1956, when its crude production was more than twice as great as that of any other parish in the state, Plaquemines had 55 producing fields. Since then, at least six others have been added.

Because of the density of its fields, Plaquemines has little virgin territory to lure the wildcatter. Its exploration success must depend on deep drilling.

World's deepest oil . . . Site of the world's deepest oil production, Plaquemines has proved that oil exists in apparently commercial quantities below 21,000 ft.

Completion last year of the record holder, 1-L Humble L. L. & E., drilled by Richardson & Bass and associates, has raised the possibility of "double decking" many fields producing from shallower depths.

Oil-hunting efforts are now aimed at the largely unexplored horizon below 10,000 ft.

As recently as 1950 there were only four wildcats drilled below 10,000 ft. in Plaquemines Parish during the whole year. By contrast, there were 28 wildcats completed there during the first half of this year and all but six of them went to 10,000 ft. or more. Three of the six successful wildcats established production below that depth and one was completed below 14,000 ft.

Largely because of deep drilling, 27 per cent of the wildcats completed in Plaquemines Parish during the first half of this year were successful. In the remainder of the state only about 16 per cent were producers.

McCarthy Returning to U.S.

HOUSTON. — Wildcatter Glenn McCarthy, who recently sold his South American holdings, is again looking for oil in this country.

The head and principal stockholder of Glenn McCarthy, Inc., said the company plans to become engaged in domestic oil operations immediately.

McCarthy said disposal of the South American property of Glenn McCarthy de Bolivia, S. A., satisfied "substantially all" the obligations of the parent company. Glenn McCarthy, Inc., now has assets totaling well over $1,000,000, he said.

Pipeline briefs

Buckeye Pipe Line Co. is ready to start operating a new 8-in. products line which will give Ohio refiners an outlet to the Chicago market. Sheehan Pipe Line Construction Co., Tulsa, has completed the take up and reconditioning of 168 miles of crude line which was converted to products from Huntington, Ind., to Griffith, Ind. Part of the line was replaced with new pipe. The project cost $2 million. A new terminal at Griffith, will serve the Chicago area. Griffith is the site of Buckeye's crude-oil tank farm and pump station.

Cities Service Gas Co. will develop Elk City field, Montgomery County, Kansas, as an underground storage reservoir to help supply peak-day requirements which have been rising. Cities Service has temporary Federal Power Commission authority for the $2,683,073 project. The field will supply 50,000,000 cu. ft. daily on the peak day in 1958-59 and 100,000,000 cu. ft. daily on the peak day of the 1959-60 heating season.

Natural Gas Pipeline Co. of America has completed its 20-in. Red River crossing on the Oklahoma-Texas border near Nocona, Tex. The crossing, delayed for months by floods, was laid by R. H. Fulton & Co. It is part of a 350-mile, 20 and 26-in. line being laid from gas fields in Jack and Wise counties, North Texas, to Fritch, in the Texas Panhandle, connecting with Natural's main line to Chicago. The southern section of the project is under way. Three spreads will be in full swing next month.

R. H. Fulton & Co. has started laying 70 miles of 8, 12, and 16-in. gas line in West Texas for Pioneer Gathering System, Inc. The project, under Superintendent Oscar Phillips, has headquarters at Sonora. The $4½-million line will gather gas in Val Verde, Sutton, and Schleicher counties for sale to Permian Basin Pipeline Co. Completion is scheduled for early fall.

Permian will take up to 200,000,000 cu. ft. daily from Pioneer. Initial deliveries are estimated at 60,000,000 to 70,000,000 cu. ft. per day. Permian has let contract to Lone Star Constructors to build 83 miles of 16-in. from its Spraberry station in Midland County to tie in with Pioneer in northwestern Schleicher County. Right-of-way and ditch work is under way. Pipe laying is scheduled to start next month. The project will be completed in about 60 days.

Northern Natural Gas Co. will lay 85 miles of loops in short sections between Sunray, Tex., and Sioux City, Iowa. R. H. Fulton & Co. has the contract for the 24 and 30-in. job, which will start some time next month. The project will be completed in about 60 days.

Ohio Oil Co. has received a certificate of public convenience and necessity to build and operate a 12-in. common-carrier products line from Robinson, site of its refinery, to Champaign, Ill. The certificate was issued by the Illinois Commerce Commission.

Panama-Williams Corp. has the contract for the 84-mile line which is to be completed in December. Pipe delivery will be completed by October 1. The line, with ultimate capacity of over 90,000 bbl. daily, will ship products for Ohio and others to a new terminal at Champaign. Next year Ohio will build a 12-in. products line from Wood River, Ill., to Chicago, linking with the Robinson line at Champaign.

Also for Pipeliners . . .

Harris natural-gas bill will be only one of several vital issues affecting oil coming before Congress next year (p. 67) . . . First Mexican gas comes north after Texas Eastern's valve-turning ceremony (p. 69) . . . Record price of 22.6 cents per M.c.f. is offered by Texas Eastern in Louisiana deal (p. 71) . . . Barber's Hill salt dome, world's largest L.P.G. cavern, also is hub of pipeline network (p. 72) . . . Pipeliners building Four Corners line find rocks a tough obstacle (p. 76) . . . It's cheaper to travel in the Four Corners area by air (p. 82) . . . More pipeline proration sets in for Texas producers after state's September allowable boosted (p. 83) . . . Edwin W. Pauley proposes a gas pipeline from Mexico to Cuba (p. 88).

PLUS THESE TECHNICAL FEATURES: Variable-speed drives lower pumping costs up to 25 per cent (p. 100) . . . and Pipeline Patrol's tips on operations (p. 131).

Headlee Unitizing Soon

● Texas commission expected to approve plan for saving 50 million barrels oil; gas injection may start November 1

MIDLAND, Tex. — Operators in mushrooming Headlee Devonian field in West Texas appear to have won a battle against time for more than 50,000,000 bbl. of crude oil.

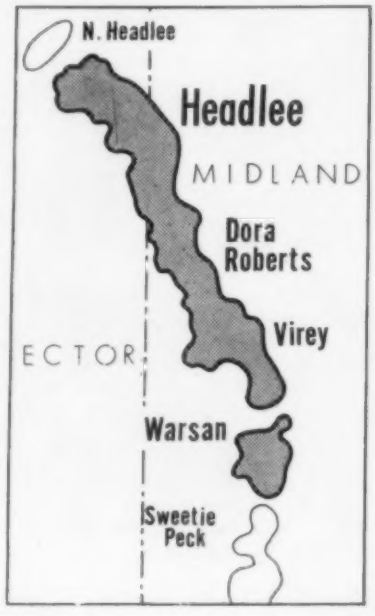
This is the volume of oil operators expect to save by unitizing the field and launching pressure maintenance before fast-dropping pressure in big Headlee skids to below the saturation level.

Last week a year-long race to accomplish this was all but over. The Texas Railroad Commission was considering unit and pressure-maintenance plans submitted by Texas Gulf Producing Co., proposed unit operator. Its approval is virtually certain.

Texas Gulf expects to begin injecting gas through an initial three input wells by November 1. Headlee pressure by that time should still be several hundred pounds above the saturation level.

The proposed unit will take in 8,391 acres of the 12,840 acres estimated productive in the reservoir. And provision is made to add more tracts to the unit as others indicate willingness to join.

Operators in the unit estimate that high-pressure gas injection into the Devonian will hike ultimate recovery to 82,824,829 bbl. This stacks up with only 19,868,619 bbl. thought producible by primary means.



Crash program . . . It became obvious to Texas Gulf and other operators early in the game that there was an urgent need to do something about Headlee's dropping pressure.

Pressure when the field was discovered in August 1953 was 5,400 psi. This fell 342 psi. to 5,058 psi. as of June 1, 1956.

In August 1956, Texas Gulf and others went to the Railroad Commission urging that the field allowable be chopped back drastically to only 3 producing days per month.

This, they said, was a must to give the operators time to unitize and carry out pressure maintenance before pool pressure fell below the saturation point at 4,450 psi. Otherwise, at the then current state-wide production rate, they couldn't get the job done quickly enough and 50,000,000 bbl. of oil would go by the boards (OGJ, Aug. 20, 1956, p. 106).

The proposal for such a large allowable slash didn't go unopposed. Carlton Beal & Associates and other small acreage holders in the field fought it.

The commission compromised on a 6-day producing pattern for the field and production has been held at that level since November 1 last year.

The injection plan . . . The Devonian in Headlee is a closed limestone anticline trending north-south. It produces via solution-gas drive from a 200-ft. oil zone topped at an average 11,800 ft. There is no gas cap.

The unit area now has 36 Devonian producers, 32 of them to be operated by the unit.

Production from the unit area to June 1 was 1,710,000 bbl. of liquids and 5,809,000 M.c.f. of gas. The solution gas-oil ratio is 3,500:1, and the ratio trend is constant. Average field-wide pressure when last checked in April was roughly 4,900 psi.

The proposed unit plans to start injecting gas through three producers operated by Tidewater Oil Co.

Residue gas will be bought from the Headlee natural-gasoline plant and injected at a rate of 800,000 to 2,000,000 cu. ft. per well per day.

The planned input pressure of about 5,500 psi. is believed to be the second highest ever projected for a pressure-maintenance project, ranking only behind the 6,500 psi. maintained by Sunray Mid-Continent Oil Co. at its Northwest Branch field in Louisiana.

The high pressure is a must to force the gas into the extremely tight Devonian limestone zone in Headlee. Though planned input pressure is 5,500 psi., compressors installed for the project will be capable of injecting at pressures up to 7,500 psi.

Injection initially, using just the three inputs, will affect only 640 acres. But if the program proves out, it will be extended to cover at least 11,400 acres. The input pattern will be a 320-acre, nine-spot.

Texas Gulf estimates oil in place originally in the Devonian in Headlee at 152,288,820 bbl. It thinks that residual oil saturation at abandonment without pressure maintenance would be about 37 per cent of pore space. Pressure maintenance, it feels, will cut this to only 19 per cent.

Evidence at an August 14 hearing disclosed that 96.7 per cent of the working interests and 96 per cent of the royalty interests have signed unit and operating agreements.

Some dissenters . . . There were no objections to the formation of the unit or the launching of the pressure maintenance program. However, independent operators suggested some changes in unit-proposed field rules.

One of the prime sources of the friction was difference of opinion as to how the project and its proposed field rules would affect adjoining Dora Roberts Devonian field.

It has been acknowledged by most operators for more than a year that these two fields produce from the same reservoir. Drilling has joined the two.

Texas Gulf, in fact, asked that four sections of what is now Dora Roberts field, including all acreage north of the Dora Roberts Ranch north boundary, be reclassified as being in Headlee and included in the unit.

Recognizing this, a Texas Gulf attorney urged that the commission act on the unit and field rules now in the unit area and consider general rules later "if it decides that it cannot establish rules for Headlee only and that rules must apply to the total Devonian reservoir in both pools."

Forest Oil Corp. and Cities Service Production Co., largest operators in Dora Roberts, did not deny that the two fields are one. But they maintained precedents have been set wherein two fields producing from the same reservoir have been permitted to continue producing under separate rules.

A Cities Service spokesman went further to say that it also appears the Virey and Warsan fields still further to the south also produce from a common source of supply with Headlee and Dora Roberts.

Plant Site Sought

National Petro-Chemicals making expansion plans

NEW YORK. — National Petro-Chemicals Corp., the nation's third-largest polyethylene producer, is betting further on the future of that plastic. It plans to build a 75-million-pound plant on the Gulf Coast to make polyethylene of medium density.

Meanwhile, the company is modifying some of its 100-million-pound capacity at Tuscola, Ill., to make a product between the high-pressure and low-pressure types and is installing a compounding plant to make 25 million pounds per year of electrical-grade polyethylene.

Later, the company plans to take the wraps off its own low-pressure process which lies outside both the Phillips and Zeigler methods. This development is now in the pilot-plant stage.

No Gulf Coast site has been picked for the new plant. It probably will be Lake Charles or Port Neches, where ethylene is available from Petroleum Chemicals, Inc., or Jefferson Chemical Co. Another location outside the Gulf Coast is being considered, but the plant will in all probability go where it will have future access to gas from one of its parent companies, Panhandle Eastern Pipeline Co.

In time, Petro-Chemical may make its own ethylene for the new plant, but does not find it practical at this time. Completion is slated for late 1958 or early 1959.

Robert E. Hulse, company vice president, looks for a 1-billion-pound polyethylene market by 1959. At 34 cents per pound, it will become competitive with paper, he feels. Since the petrochemical plastic now sells for 35 cents, he looks for a major marketing breakthrough over the next few years.

The company is further widening its scope with a planned operation to make polyvinyl chloride resin from acetylene to be supplied by another petrochemical company. Official announcement will be made in a few weeks. In addition, consideration is being given to butadiene synthesis at the original Tuscola plant.

The Experts Talk

NEED A THUMBNAIL digest of the latest petroleum literature?

The Oil and Gas Journal has just published two article guides—one for drilling and production men, the other for refiners and processors.

Both give descriptive summaries of important technical articles recently published. They'll save you time and help you get facts quickly.

These booklets may be obtained free by writing Reader Service, P. O. Box 1260, Tulsa, Okla.

Crude Line Pushed

Three new contracts let for Four Corners work

HOUSTON. — The Four Corners crude line, already moving ahead rapidly, got another boost last week when additional construction contracts were made.

A.P.V. Co., Inc., Fort Worth, and R. B. Potaschnick of Cape Girardeau, Mo., will build the 104-mile section of 16-in. trunk line between Seligman, Ariz., and the Colorado River to the west.

Pacific Pipeline Co. of Montebello, Calif., received the contract for construction of 46 miles of 16-in. from Olive, Calif., into Los Angeles.

Standard Pipeline Construction Co. of Farmington, N. M., will build the feeder lines to connect various fields in Utah and New Mexico.

R. G. McIntyre, president of Four Corners Pipe Line Co., said work on the line is ahead of schedule. More than 135 miles of 16-in. trunk line is already completed. January is the target date for completion.

The line will carry crude from oil fields in the Four Corners area to refineries near Los Angeles. Design changes will give the line an initial capacity of 70,000 bbl., rather than 60,000 bbl. as announced previously.

Calgary Gets Sulfur Plant

CALGARY.—Jefferson Lake Sulphur Co. has decided definitely to build a sulfur extraction plant just east of Calgary.

The company several months ago negotiated an 80,000-acre farmout from Mobil Oil of Canada, Ltd., to test the sulfur content of gas in the East Calgary field. Two well completions indicate heavy sulfur recovery.

The plant is expected to produce 425 long tons of sulfur daily and produce at least 50 million cubic feet of gas.

Jefferson Lake currently is building a sulfur extraction plant in the Peace River area of British Columbia and has negotiated with Westcoast Transmission Co. to build another at Coleman, Alta., near the Savanna Creek field.

—— *Industry* briefs

Leonard Crude Oil Co. and Aurora Gasoline Co. cut the posted prices of Michigan crude 15 cents a barrel last week. Carter Oil Co., which produces 1,200 bbl. daily in Michigan, immediately announced it would not deliver crude at the new prices. Leonard blamed the cut on "accumulating resistance on the part of our refiner customers to use Michigan crude oils."

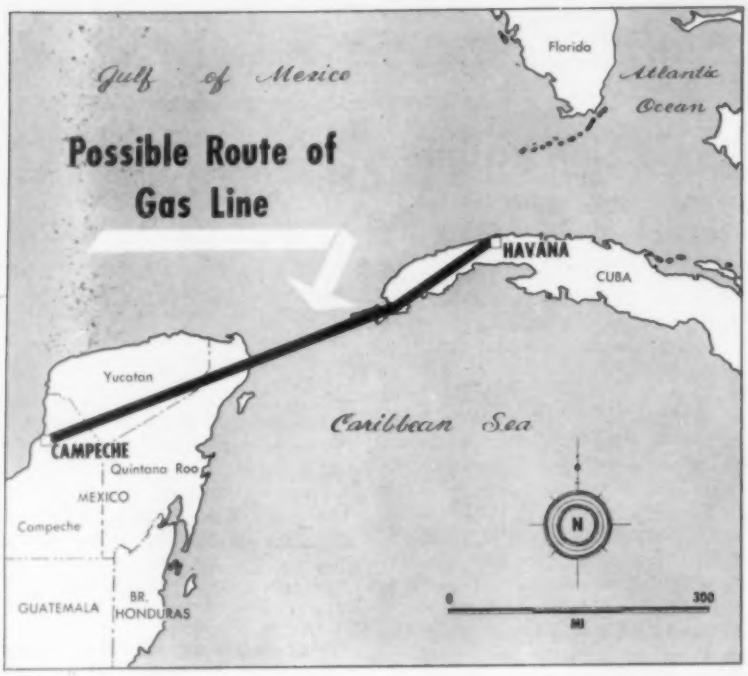
Carter did not say what it would do with the crude other than it is "looking around." The company said the old postings are justified and are the best buy available for Michigan refineries. Carter, Pure Oil Co., and Gulf Oil Corp. are principal producers in Michigan.

Tekoil Corp., Dallas, has bought all the oil properties of Texolina Oil Co. and personal properties of its president, Kenneth Ellison, Oklahoma City. The stock transfer will give Tekoil an additional 216 bbl. of oil production and 1,013 M.c.f. of gas production daily, plus 1,000,000 bbl. of oil reserves.

Producing Properties, Inc., Dallas, has purchased 206 oil and gas wells on 69 leases owned by the Earl Hollandsworth and Less Travis interests of Longview, Tex. Payment exceeded $7 million. All wells involved in the sale are in East and North Texas. Hollandsworth and Travis retained one-half interest in deep rights of the wells below the present producing horizon.

Stockholders have approved the merger of Marine Drilling, Inc., and American Tidelands, Inc. Lloyd M. Bentsen, Jr., former president of Tidelands, is president of the combined firm, which will retain the name, Marine Drilling, Inc. J. F. Corley, former president of Marine Drilling, was named executive vice president of the new firm. Combined assets of the reorganized company, totaling more than $4,000,000 include four inland water drilling barges and one deep-water barge.

McRae Oil & Gas Corp. has expanded with two recent purchases. Company paid $700,000 cash and 200,000 shares of McRae stock for the Bergkamp lease in Cowley County, Kansas. Property contains 24 producing oil wells with net income of about $20,000 monthly. McRae also acquired the outstanding stock of Paradox Oil & Gas Co. for 125,000 shares of McRae. The company's chief assets are 511,000 acres of oil and gas leases in the Paradox and Unitah basins of Utah.



Proposed Gas Pipeline Would Span Sea from Mexico to Cuba

EDWIN W. PAULEY, independent California operator, is dangling a Mexican gas supply before the eyes of Cuban electric power interests in one of the most grandiose gas transmission schemes yet.

Pauley wants to lay a 120-mile natural-gas pipeline on the ocean floor across the Gulf of Mexico to Cuba. American & Foreign Power Co., which generates electric power for Cuba, is interested—if engineering studies prove such a project is feasible from a practical and engineering standpoint.

Henry Sargent, president of American & Foreign Power, conceded in New York last week that he has been approached by Pauley and that preliminary studies of such an undersea pipeline are being made by Ebasco Services.

Sargent described the entire project as in a "nebulous and intangible state" for the present, but he added that because of his company's "large fuel requirements" that a "firm supply of fuel on a long-term contract basis certainly would be attractive to us."

He said the future of Pauley's project will depend entirely on the studies now being made by Ebasco and whether or not these studies indicate that more detailed investigations are warranted.

Pauley, who has long been active in northern Mexico drilling on a contract basis for Petroleos Mexicanos, the government's monopoly oil agency, approached Sargent with his proposition assuring him of a substantial gas supply. Pauley's arrangements with Pemex which would allow him to negotiate for Mexican gas are not clear.

Pauley proposes to build his gas line overland in Mexico from the Campeche area, where Pemex has a large and uncommitted gas supply, to the eastern coast. From this point the line would be submarine — at some points more than a mile under water and on the ocean floor. It would take another 150 miles or so of land pipeline in Cuba to get the gas to Havana. All in all, the pipeline would be about 650 miles in length.

South of where Pauley's line would originate, Hudson Engineering Co., Houston, is putting the finishing touches on a 300,000 M.c.f. daily absorption plant in Mexico's isthmus State of Tabasco. It is this same general area that Pemex is building its "Ciudad Pemex," intended to be an "oil city" to lead the entire region in development that will eclipse anything Mexico has yet.

Hudson built a twin plant at Reynosa at a cost of $7 million. It is from this plant that the dry gas supply is being taken by Texas Eastern Transmission Corp. for New England markets (see page 69).

Panama Lease Sold

United Fruit to complete survey, drill well in '58

UNITED FRUIT CO. has acquired a concession covering more than 1,000,000 acres in Panama.

The area is in Chiriqui Province on the Pacific Coast near some of the company's banana plantations. The acreage was acquired from Cataract Mining Corp., New York, which has an interest in a total of 5,000,000 acres in the country.

United Fruit will operate the concession itself. It plans to complete a seismic survey and drill one well in 1958. Surface investigations and aerial photography will begin within a month.

United Fruit owns the concession outright. Rights will continue for 20 years with an option for a 20-year renewal. Cataract Mining, Cia. Petrolera Urraca, and an attorney by the name of Beiberach will receive overrides totaling 4½ per cent of gross production.

Uruguay Awards Contract

Contract for the long planned expansion program to double the throughput of Uruguay's only refinery —a 28,000-bbl. plant—was awarded last week to W. M. Kellogg Co.

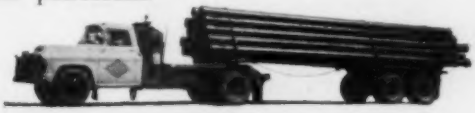
Uruguay's government-owned Administracion Nacional de Combustibles, Alcohol y Portland (ANCP) will pay Kellogg roughly $11 million over a 5-year period for the work. Plans call for a second 28,000-bbl. crude distillation unit, a 10,000-bbl. vacuum unit, a 5,000-bbl. fluid cat cracker, and a 3,000 bbl. Platformer.

Congrats and $25 to LOCKWOOD H. POOL, 424 Shell Bldg., New Orleans, La., for this quip.

"..thinks a female connection is a steady date."

The oil country has a whopping big appetite for pipe. Lone Star Steel's huge plant was built for the specific purpose of supplying fully normalized *API casing, tubing and line pipe* to Joe Roughneck, heart of the oil and gas industry. As fast as we can make it, he gets it!

Now . . . we're building again . . . our new stretch-reducing mill and another open hearth furnace. Goal: more fine steel and more pipe . . . to help Joe meet the greater domestic and export demand for petroleum.



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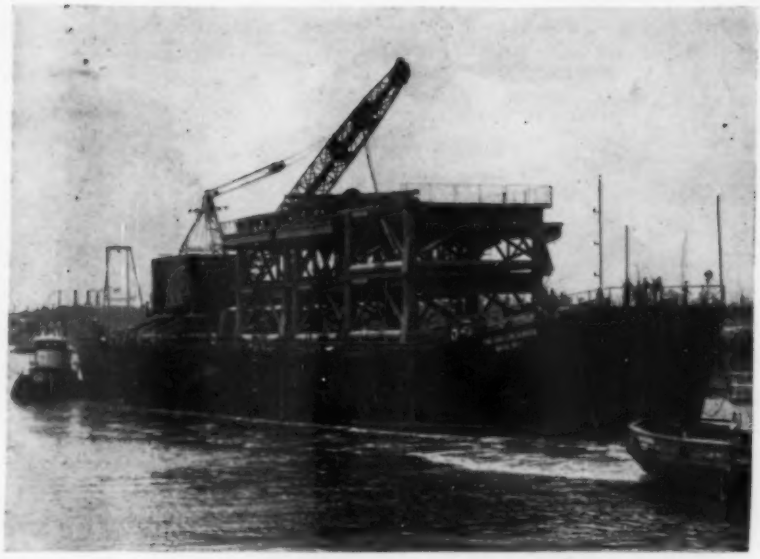


Gulf of Paria Drilling Slated

FOUR DEEP-WATER drilling platforms are being towed from Houston to the Gulf of Paria between Trinidad and Venezuela where they will be used in exploring a $100,000,000 oil concession.

The platforms, fabricated by Brown & Root Marine Operators, Inc., are shown starting down the Houston Ship Channel for the long voyage to South America. The trip is expected to take about 20 days.

Destination of the drilling structures is a concession covering about 150,000 acres which was granted by the Venezuelan Government earlier this year. Holders of the concession include Continental Oil Co. of Venezuela, Ohio Oil Co. of Venezuela, Texas Petroleum Co., Cities Service Oil Co., and Richfield Oil Corp.

Details of the exploration program to be conducted by the five-company group have not been disclosed, but drilling is expected to begin in the near future. Continental, Ohio, and Texas Petroleum have 25 per cent interest each in the underwater concession. Cities Service has 16⅔ per cent interest and Richfield has the remaining 8⅓ per cent.

Brown & Root crews will set the platforms with the derrick barge used to transport them. One platform will be in 75 ft. of water, two in 90 ft., and one in 95 ft.

Superior Strikes Confirmed

AT LEAST one of the rank newcomers to Venezuela can look at its high-priced Lake Maracaibo acreage with satisfaction.

Superior Oil Co. has confirmed what has been known for some time in Venezuela. The company has two good wells on the 7,774-acre national reserve block in the central lake region which it obtained last year.

The company reports that 1 Lama flowed 3,360 bbl. daily of 30°-gravity oil on a drill-stem test. Industry sources say this is a very conservative flow figure for the well.

No. 1 Lama is being dually completed. A month ago the well had logged 257 ft. of oil sand and another 30 ft. of silty sand above 8,000 ft. At that time the well was still drilling in the pay.

No. 5 Lama, the company's second well on the same block, is about 2½ miles to the southwest. It has been completed flowing at the rate of 7,650 bbl. daily of 36°-gravity crude, Superior says. It reportedly logged more than 350 ft. of the same Eocene pay found in 1 Lama.

No. 5 Superior well is about 5½ miles north of the test Sun Oil has drilled on the big Lot 1 which it owns jointly with Venezuelan Atlantic Refining Co. and Seaboard Oil Co.

Sun not talking . . . Consistent reports from Caracas for more than a month refer to Sun's first test, SVSX-1 as either a dry hole or at best as a noncommercial well.

The first report was that the well found less than 20 ft. of promising Miocene sand above 10,000 ft. The company regards the test as a tight hole and is not talking about what it has or has not found.

Reports last week indicate the well has been drilled well below 13,000 ft. Sun says only that it is testing the well. The Sun group paid more than $18 million in bonuses for the 24,700-acre block. In the later bidding a combine of Sun, Atlantic, Seaboard, and Pan Venezuelan Oil Co. (formerly Stanolind) got Lot 12 adjoining Lot 1 on the west. They paid more than $32,500,000 for this block.

Superior topped all the bidding with its record bonus of $2,831 an acre for the "L"-shaped national reserve tract of less than 8,000 acres just to the north of the Sun group's Lot 1. It appeared last week that Superior's money was well spent.

Barge Will Go to Honduras

An offshore drilling barge now under construction at Vicksburg, Miss., is expected to be used in drilling the first oil test on a large concession in Honduras.

Barnwell Offshore, Inc., Shreveport, recently obtained one-half interest in the concession, to be held jointly with Cia. Petrolera Hondurena, S.A. (OGJ, Aug. 12, p. 91). The concession, including both onshore and offshore lands, covers some 51,000,000 acres.

R. S. Barnwell, Jr., president of the Shreveport firm, said definite exploration plans will be made after completion of legal work on the acquisition. He pointed out, however, that the company's new barge, scheduled for delivery in September, probably will go to work on the Central American concession.

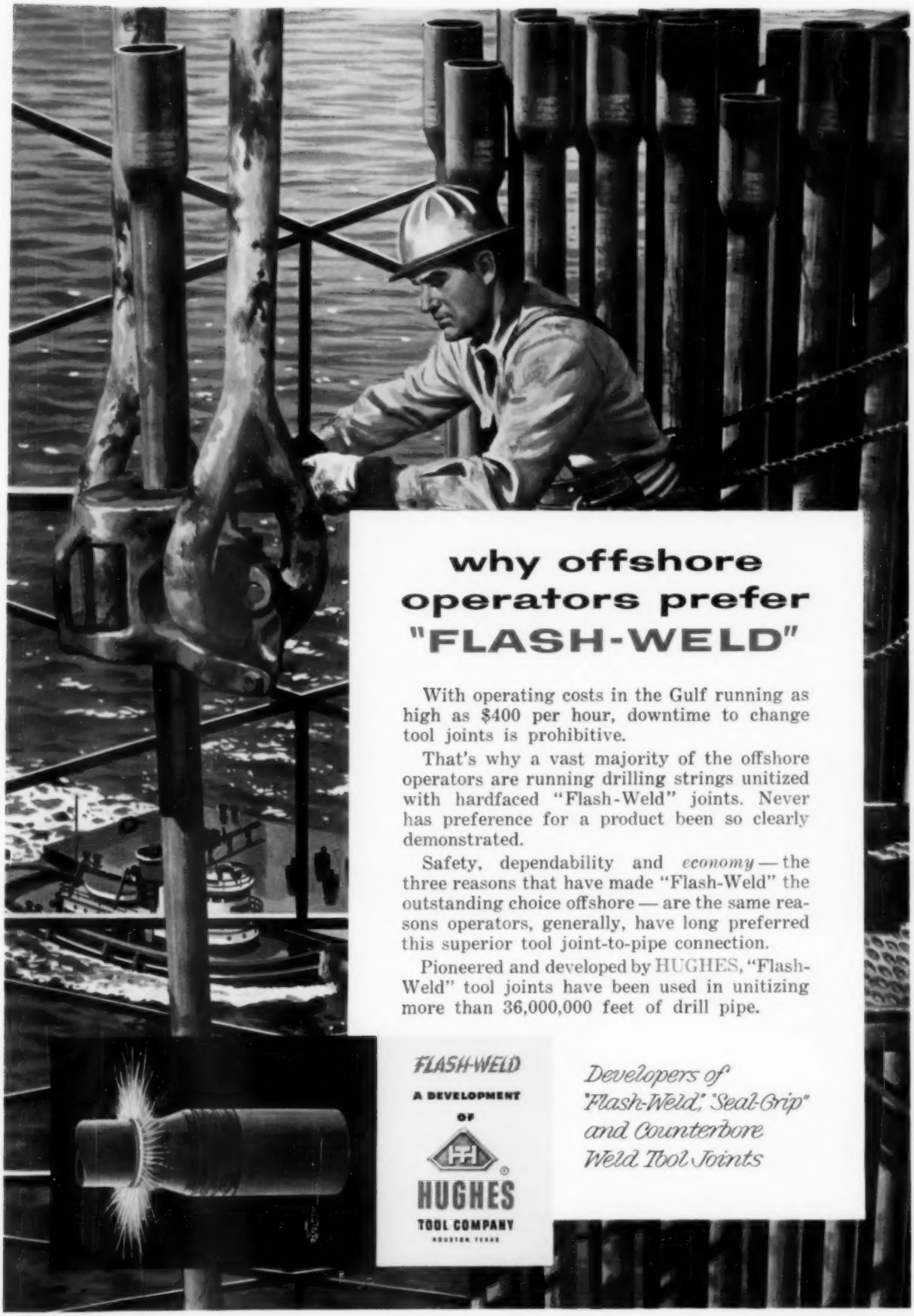
Petrochem Plant Planned

A BRITISH affiliate of Union Carbide Corp. plans to open a major petrochemical plant at Fawley, England, in 1959.

The plant will have an intial capacity of 45,000,000 lb. per year, producing ethylene oxide derivatives. The nearby 150,000-bbl. refinery of Esso Petroleum Co. will supply feedstocks.

Engineering studies for the project are completed and the plant design is in the final stages. The plant will turn out ethylene oxide, ethylene glycols, polyethylene ethanolamines, and glycol esters.

The Union Carbide organization has a 24,000,000 lb. per year polyethylene plant under way at Grangemouth, Scotland. It will be completed in October.



why offshore operators prefer "FLASH-WELD"

With operating costs in the Gulf running as high as $400 per hour, downtime to change tool joints is prohibitive.

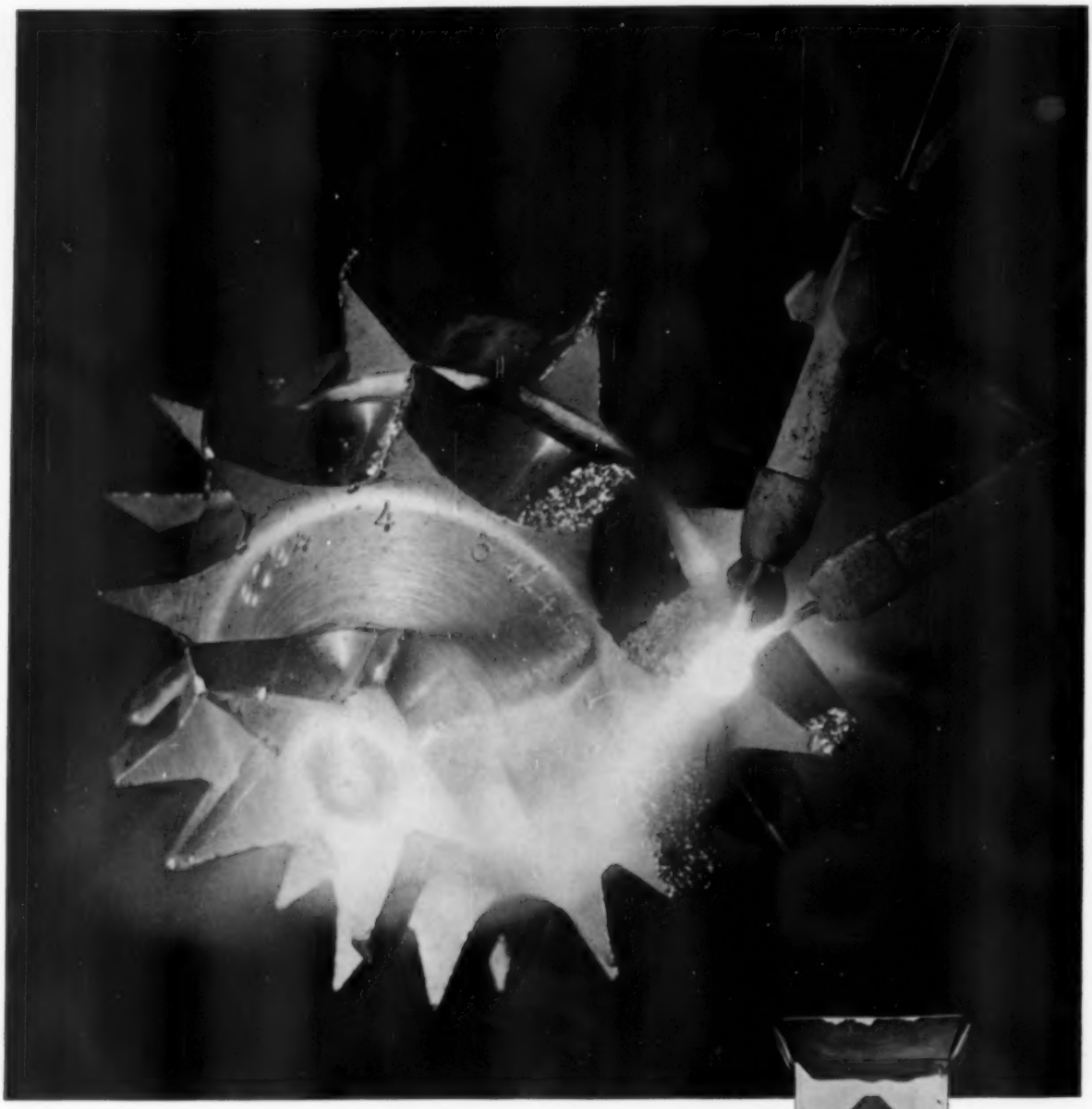
That's why a vast majority of the offshore operators are running drilling strings unitized with hardfaced "Flash-Weld" joints. Never has preference for a product been so clearly demonstrated.

Safety, dependability and *economy* — the three reasons that have made "Flash-Weld" the outstanding choice offshore — are the same reasons operators, generally, have long preferred this superior tool joint-to-pipe connection.

Pioneered and developed by HUGHES, "Flash-Weld" tool joints have been used in unitizing more than 36,000,000 feet of drill pipe.

FLASH-WELD
A DEVELOPMENT
OF
HUGHES
TOOL COMPANY
HOUSTON, TEXAS

Developers of "Flash-Weld," "Seal-Grip" and Counterbore Weld Tool Joints



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when and where it's needed!

— another reason you make hole faster with Hughes Rock Bits

How and where hardfacing is applied is as important as the hardfacing material itself.

In getting the facts to determine the *best* application and placement of hardfacing, over one hundred thousand rock bits are examined in the field and the laboratory each year.

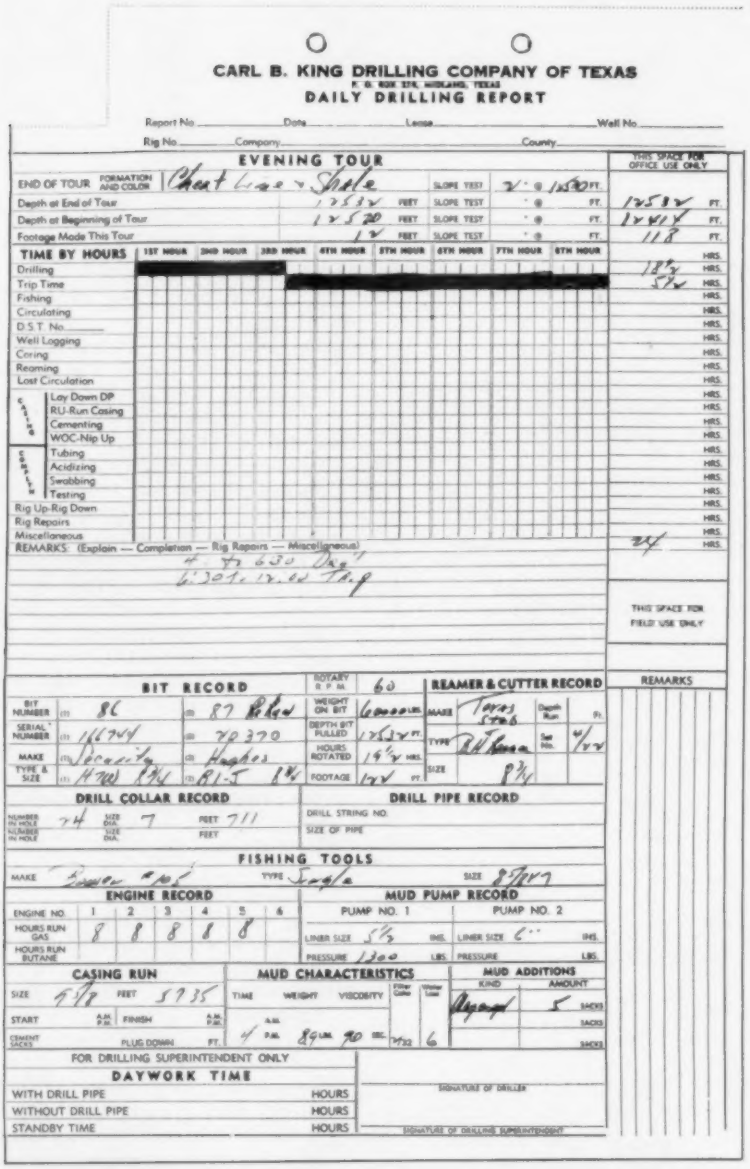
The combination of experience, our own superior hardfacing (Hughesite) and the knowledge of just where and how to apply it, is still another reason why HUGHES rock bits can be depended upon to deliver consistent, dependable performance, time-after-time.

Drilling Contractors!

Know your TIME to insure your PROFIT

Carl B. King's accounting system puts the accent on time. Here's the story of how drilling records are put to work to speed estimating and improve public relations

By Douglas B. Wright



CARL B. KING DRILLING COMPANY OF TEXAS
P. O. BOX 276, MIDLAND, TEXAS
DAILY DRILLING REPORT

Report No. _____ Date _____ Lease _____ Well No. _____
Rig No. _____ Company: _____ County: _____

EVENING TOUR

END OF TOUR — FORMATION AND COLOR: Chert Lime & Shale — SLOPE TEST: ½° @ 1550 FT.
Depth at End of Tour: 17538 FEET — SLOPE TEST: ° @ FT. — 17538 FT.
Depth at Beginning of Tour: 17520 FEET — SLOPE TEST: ° @ FT. — 17414 FT.
Footage Made This Tour: 18 FEET — SLOPE TEST: ° @ FT. — 118 FT.

THIS SPACE FOR OFFICE USE ONLY

TIME BY HOURS	1ST HOUR	2ND HOUR	3RD HOUR	4TH HOUR	5TH HOUR	6TH HOUR	7TH HOUR	8TH HOUR	
Drilling									13½ HRS.
Trip Time									5½ HRS.
Fishing									HRS.
Circulating									HRS.
D.S.T. No.									HRS.
Well Logging									HRS.
Coring									HRS.
Reaming									HRS.
Lost Circulation									HRS.
CASING: Lay Down DP									HRS.
CASING: RU-Run Casing									HRS.
CASING: Cementing									HRS.
CASING: WOC-Nip Up									HRS.
COMPLETION: Tubing									HRS.
COMPLETION: Acidizing									HRS.
COMPLETION: Swabbing									HRS.
COMPLETION: Testing									HRS.
Rig Up-Rig Down									HRS.
Rig Repairs									HRS.
Miscellaneous									HRS.

REMARKS: (Explain — Completion — Rig Repairs — Miscellaneous)
#4 Pump 630 Dog
6:30 to 12:00 Trip

24 HRS.

THIS SPACE FOR FIELD USE ONLY

BIT RECORD

	(1)	(2)	(3)
BIT NUMBER	86	87 RR	
SERIAL NUMBER	116744	79370	
MAKE	Security	Hughes	
TYPE & SIZE	H-70 8¾	R1-J 8¾	

ROTARY R.P.M. 60
WEIGHT ON BIT 40000 LBS.
DEPTH BIT PULLED 17538 FT.
HOURS ROTATED 19½ HRS.
PRESSURE 1300 LBS.
FOOTAGE 118 FT.

REAMER & CUTTER RECORD

	Depth Run	Ft.
MAKE: Tarns Stab		
TYPE: RW Reamer	Set No.	41/118
SIZE: 8¾		

REMARKS

DRILL COLLAR RECORD

	SIZE DIA.	FEET
NUMBER IN HOLE 14	7	711
NUMBER IN HOLE	SIZE DIA.	FEET

DRILL PIPE RECORD
DRILL STRING NO.
SIZE OF PIPE

FISHING TOOLS
MAKE Bowen TYPE Single SIZE 8¾x4

ENGINE RECORD

ENGINE NO.	1	2	3	4	5	6
HOURS RUN GAS	8	8	8	8	8	
HOURS RUN BUTANE						

MUD PUMP RECORD

	PUMP NO. 1	PUMP NO. 2
LINER SIZE	5½ INS.	6" INS.
PRESSURE	1300 LBS.	LBS.

CASING RUN

SIZE	9⅝	FEET	5935
START	A.M. P.M.	FINISH	A.M. P.M.
CEMENT SACKS		PLUG DOWN	FT.

MUD CHARACTERISTICS

TIME	WEIGHT	VISCOSITY	Filter Cake	Water Loss
A.M. 4 P.M.	8 LBS.	40 SEC.	2/32	6

MUD ADDITIONS

KIND	AMOUNT
Aquagel	5 SACKS
	SACKS
	SACKS

FOR DRILLING SUPERINTENDENT ONLY

DAYWORK TIME

WITH DRILL PIPE	HOURS
WITHOUT DRILL PIPE	HOURS
STANDBY TIME	HOURS

SIGNATURE OF DRILLER
SIGNATURE OF DRILLING SUPERINTENDENT

DAILY DRILLING REPORT consists of a form such as this for each tour. Time is completely accounted for by the black bars. Fig. 1.

TIME—the most important item any service organization has to sell—can add up to the difference between profit and loss in the oil-well drilling-contracting business.

In bidding, a miscalculation of time can cause a contractor to lose the job—or lose his shirt. Accurate records of time consumed in the various drilling operations are as valuable to the estimator as his knowledge of payroll costs or rock bits.

Accumulating drilling time data has been complicated by the general lack of two basic essentials:

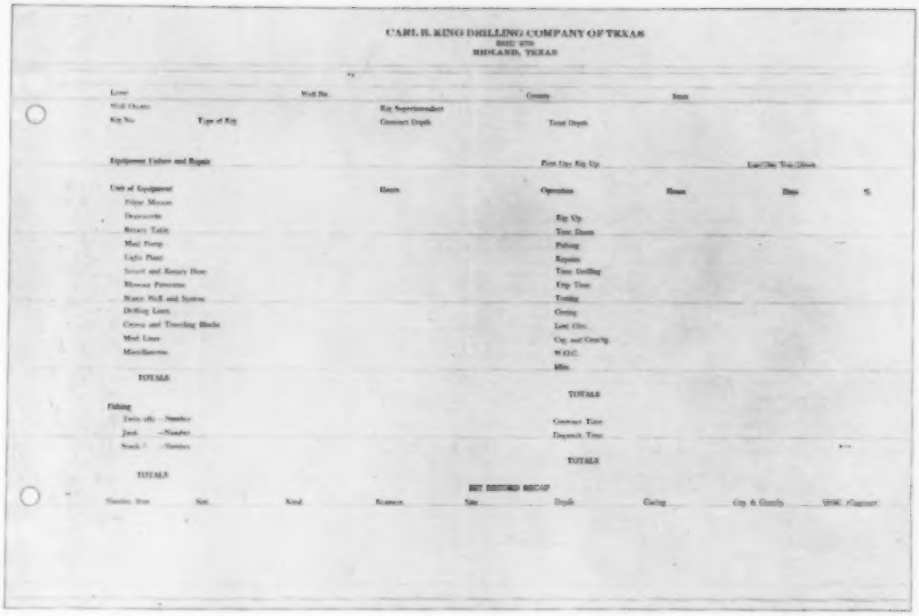
- Definition, and
- Systematic methods.

Steps toward supplying these "missing links" are being taken by the oil-well drilling contractors association, and by individual firms which have worked out successful systems for using drilling-time data in accounting and estimating.

Unit cost system . . . Drilling-time analysis has become increasingly important as more and more contractors adopt the unit cost system of accounting. The principal purposes of unit cost accounting are: to make more equitable distribution of large expense items to wells; to speed up the completion of well costs; to develop accurate costs per unit of work; and to provide estimating gages for management.

In this method, recurring costs for each drilling rig are averaged and prorated to each contract on which the rig is used. This poses the necessity to standardize terms, so that each item of cost (such as labor, supervision, maintenance, supplies, etc.) will mean

Author is secretary-treasurer, Carl B. King Drilling Co., Midland, Tex., and member, accounting committee, American Association of Oilwell Drilling Contractors.



CARL B. KING DRILLING COMPANY OF TEXAS
BOX 270
MIDLAND, TEXAS

Lease | Well No. | County | State

Well Owner | Rig Superintendent

Rig No. | Type of Rig | Contract Depth | Total Depth

Equipment Failure and Repair | First Day Rig Up | Last Day Tear Down

Unit of Equipment	Hours	Operation	Hours	Days	%
Prime Movers		Rig Up			
Drawworks		Tear Down			
Compound		Fishing			
Rotary Table		Repairs			
Mud Pump		Time Drilling			
Light Plant		Trip Time			
Swivel and Rotary Hose		Testing			
Blowout Preventer		Coring			
Water Well and System		Lost Circ.			
Drilling Lines		Csg. and Cmt'g			
Crown and Traveling Blocks		W.O.C.			
Mud Lines		Misc.			
Miscellaneous					
TOTALS		TOTALS			

Fishing
Twist Off — Number
Junk — Number
Stuck — Number
TOTALS

Contract Time
Daywork Time
TOTALS

BIT RECORD RECAP

Number Run	Size	Kind	Reamers	Size	Depth	Casing	Csg. & Cementing	W.O.C. (Contract)

RECORD BOOK in the office contains this complete summary at the end of the well. On the back of this page are columns for each time element and well information. These are posted each day from the drilling report. Fig. 2.

CARL B. KING DRILLING COMPANY OF TEXAS
BOX 270
MIDLAND, TEXAS

Lease: Big Ben | Well No.: 1 | Enter | County, State of: Texas

Well Owner: Carlton Beal & Associates | Rig Superintendent: T. T. Thompson

Rig No.: 7 | Type of Rig: National "100" | Contract Depth: 12,140 | Total Depth: 12,140

Equipment Failure and Repairs | First Day Rig Up: 7-1-56 | Last Day Tear Down: 4-9-56

Unit of Equipment	Hours	Operation	Hours	Days	%
Prime Movers	3.00	Rig Up	68.00	2.83	4.10
Drawworks	1.00	Tear Down	6.00	.25	.36
Compound	2.00	Fishing	5.00	.21	.30
Rotary Table	1.00	Repairs	10.75	.45	.65
Mud Pump	3.25	Time Drilling	887.50	36.98	53.59
Light Plant		Trip Time	395.75	16.49	23.90
Swivel & Rotary Hose		Testing	103.00	4.29	6.22
Blowout Preventer		Coring	-	-	-
Water Well & System		Lost Circulation	-	-	-
Drilling Lines	.50	Csg. & Cementing	49.50	2.06	2.99
Crown & Traveling Blocks		W. O. C.	130.50	5.44	7.88
Mud Lines		Miscellaneous	-	-	-
Miscellaneous		Totals	1656.00	69.00	100.00
Total	10.75	Contract Time	1553.00	64.71	93.78

Fishing
Twist Offs—Number
Junk Cones—Number 1 | 5.00 | Daywork Time | 103.00 | 4.29 | 6.22
Stuck —Number | | Totals | 1656.00 | 69.00 | 100.00
Total | 5.00

BIT RECORD RECAP

Number Run	Size	Kind	Reamers	Size	Depth	Casing	Csg. & Cementing	W.O.C. (Contract)
1	17-1/2	C	-	-	405	12-3/4	6.00	28.00
11	11	Jet	-	-	6025	8-5/8	16.50	54.50
65	7-5/8	630-281	25	7-5/8	12140	5-1/2	27.00	48.00

REPORT TO OPERATOR contains the time and bit records which are taken from the record book at the end of the well. This is bound in a folder with the graphs of well information (Fig. 4) Fig. 3.

TABLE 1
Application of Drilling Time Factors to Estimating
(See Time Summary, Fig. 3)

Rig-contract-day factors and comments—

Fishing and repairs—A time unit should be included in the bid as "insurance." Can develop an average day or hour factor.

Time drilling—This figure is derived from company bit records or other available bit records from jobs in the area. This factor designates actual time on bottom.

Trip time—Based on average round-trip time to contract depth (from previous time summaries) times the estimated number of bits to be used on the job.

Lost circulation—In some areas, lost circulation should be counted as a rig-contract-day factor in estimating, or else be provided for otherwise in the contract. In known lost-circulation areas, the contract provision may be up to 72 hours.

Casing and cementing—Either rig contract day or day-work time, to be specified in contract.

Waiting on cement—Either rig contract day or day-work time, to be specified in contract.

Miscellaneous—This factor includes time spent on hole deviation tests run on wire line, for example. It can be an important factor if past records show a great deal of time in this category, and may indicate a bad crooked-hole problem. Also includes time for mixing mud.

Rig up and tear down—Estimated from experience with rig used.

the same to everybody in the drilling organization.

For the system to work, it is also necessary to adopt a costing unit yardstick—a specific period of time—that can easily be applied to accounting and estimating. Just as the cost items themselves must be adequately defined, to prevent confusion in transmitting information from driller to accounting department, the time measuring unit must also be defined.

The cost yardstick . . . The definition problem in drilling-time analysis was tackled by the American Association of Oilwell Drilling Contractors accounting committee, in a conference on the revision of the A.A.O.D.C. Accounting Manual. One of the principal additions to the new edition is a complete chapter on the unit cost method of accounting, which relies on accurate time analysis for successful application. The committee developing the manual realized that there are almost as many methods used in computing time as there are drilling contractors.

To achieve uniformity within the industry, the committee adopted the "Rig Contract Day" as the standard costing unit. The term was then defined as: "any 24-hour period during which work is being done that is pertinent to the whole drilling contract, and which requires the presence of the complete drilling rig manned with adequate crews for its preparation, operation, and disengagement.

"Consequently the rig contract day includes every 24-hour period from rigging up through tearing down inclusive, less idle time with or without watchman. It would not include the moving time or the time involved in preparing the location, laying water and fuel lines, and stacking or storing the rig."

Contract vs. day-work time . . . With the rig contract day accepted as the basis to establish time, it is then necessary to distinguish between "contract time" and "day-work time." The simplest distinction is that contract time is that used in fulfilling the contract; the day-work time is that used in making tests, cores, and completing the well, for which the contractor is paid on a per diem basis.

When the basic definitions are firmly established, the next step is to devise a workable method for putting time analysis to work.

A workable method . . . Such a system has been in effect at Carl B. King Drilling Co. for 10 years, and has been found successful in providing multipurpose records for accounting, estimating—and even company public relations.

The starting point in the Carl B. King system is the daily drilling report (Fig. 1). Time information is taken from the report as it is received in the Midland office, and posted immediately in the job ledger (Fig. 2) as a continuous hourly record of each drilling operation. At the end of the job, the hourly factors are converted to a day basis, for a quick summary of the completed contract.

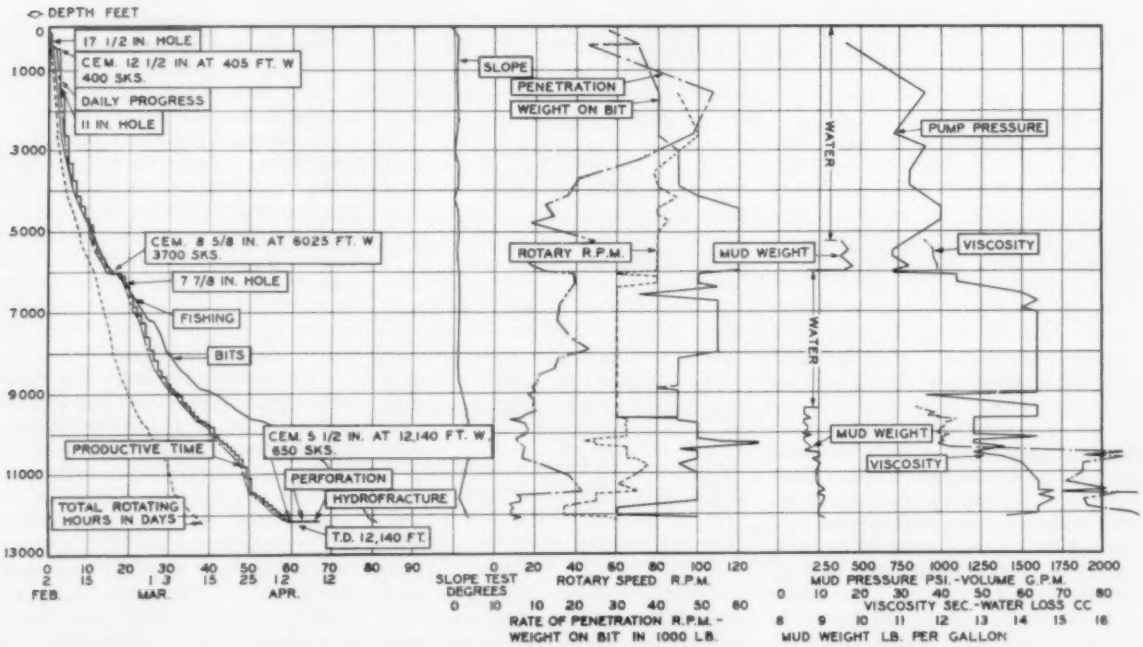
On the very day the job is finished, the contractor has an accurate report on: number of hours on bottom drilling; trip time; repair time; fishing time; time rigging up and tearing down; time spent running casing; and waiting-on-cement time.

Report on well . . . The time-analysis summary form used by King Drilling is shown in Fig. 3. Ten or more copies of the form are reproduced, to provide each company executive and the tool pusher with an information copy, plus copies for the permanent contract and rig record files.

A larger version of the time summary and bit record is bound in an 11½ by 15-in. folder, together with a chart of drilling time vs. depth, and given to the operator as a complete and interpretative record of the drilling operation (Fig. 4). The drilling chart which forms a part of the presentation folder also illustrates hole deviation, rate of penetration and mud program.

This gesture has proved of excellent public relations value to the King company, since it is a permanent record identifying the contractor with the job. It has a further, strictly practical value to the operator's engineers in furnishing a ready-made analysis of the job which proves helpful in planning the next well in the field.

Within the contractor organization, the time summary is also applied to the profit and loss statement (Fig. 5),



ALL WELL DATA are reported to the operator in graphical form. This information comes directly from the daily drilling report. Fig. 4.

CARL B. KING DRILLING COMPANY OF TEXAS
CONTRACT PROFIT AND LOSS STATEMENT

LEASE Big Ben WELL NO. 1 Exter COUNTY Texas STATE
WELL OWNER Carlton Beal & Associates TOOLPUSHER T. T. Thompson
RIG NO. 7 TYPE OF RIG National 100 CONTRACT DEPTH 12,140 TOTAL DEPTH 12,140

FIRST DAY 2 - 1 - 56 LAST DAY 4 - 9 - 56

				PERCENTAGE CONTRACT	PERCENTAGE ELAPSED
RIG UP 2.83 TEAR DOWN .25	3.08	DAYS	4.76	4.46
FISHING .21 REPAIRS .45	.66	"	1.02	.98
CONTRACT DRILLING DAYS	60.97	"	94.22	88.36
TOTAL CONTRACT TIME	64.71	"	100.00%	93.78
DAYWORK: DRLG. - TESTG 4.29	4.29	"		6.22
TOTAL ELAPSED TIME	69.00	"		100.00%

	TOTALS	PER DAY	ESTIMATE
INCOME:			
Footage			
Daywork			
Reimbursed Cost			
TOTAL INCOME			
COST:			
Labor and Supervision			
Rig Supplies, Hand Tools			
Valves & Fittings			
Oil & Greases			
Rig Maintenance & Repairs			
TOTAL DIRECT OPERATING EXPENSE			
Rig and Drill Pipe Rental			
Administrative Overhead			
TOTAL INDIRECT OPERATING EXPENSE			
CONSTANT RIG OPERATING COST			
Bits and Reamers			
Trucking and Spotting			
Pits, Cellar, Dirt Work and Lumber			
Derrick or Mast			
Fuel: Lines, Gals. Type			
Water, Inc. Lines, Source			
Mud and Chemicals			
Rental Tools & Services			
Spec. Mat'l. & Services			
VARIABLE EXPENSE			
TOTAL COST			
NET PROFIT OR (LOSS)			
Percentage of Profit or (Loss)			

Footage Profit $ @ Profit per Day $
Daywork Profit $ @ Profit per Day $

Cost of Footage Contract:
Total Cost $
Per day Cost
Fuel
Less: Cost of Daywork Days at $ $
Reimbursed Cost Billed $
Net Cost of Footage Contract $
Average Cost per Foot $

Bits Used:

No.	Type	Runs	Size	Depth	Out	W. O. C.	
1	C	-	17-1/2	405	12-3/4		28.00
15	Jet	-	11	6025	8-5/8		54.50
65	630-2R-1	25	7-5/8	12140	5-1/2		48.00
1	C	-	4-5/8	Drill Pipe			

Estimate Information:
Days Bits Cost per Foot $ Estimated Profits $

Remarks:

CONTRACTOR'S REPORT on the well uses the time summary as the basis for figuring profit and loss. Rig operating cost provides a good comparison between rigs. Fig. 5.

to show the proportions of the total time required by the various drilling operations.

Bidding application . . . Perhaps the most valuable use of the time summary is in estimating. The time analysis summary, with time factors translated into rig contract days, enables the estimator to reduce his task to the formula:

Cost = (Rig Contract Days × Constant Cost Factor) + Variables.

In this formula:

Rig contract days are estimated from previous time summaries on similar jobs with the same rig;

Constant cost factor is based on the contractor's average cost of labor, supervision, supplies (hand tools, fittings, oil, greases, etc.), maintenance, overhead and depreciation; and

Variables include the estimated cost of moving, site preparation, water and fuel (including cost of laying water and fuel lines), required bits, casing

"In this method, recurring costs for each drilling rig are averaged and prorated to each contract on which the rig is used. . . . This system has the dual advantages of contributing to more accurate bid estimates, and also providing a complete record of performance on each rig."

crews, time recorder, and other rental tools.

The total arrived at by this formula is the gross cost. This figure, divided by the number of feet contracted for, yields the footage cost. A profit factor is added to arrive at the bid estimate.

In estimating practice, the time element recorded on the summary and classified as rig-contract-day factors, are shown in Table 1.

Keep up-to-date . . . It is apparent that for estimating purposes it is essential to maintain accurate historical time and cost records in order to arrive at accurate unit cost factors. Generally speaking, King has found that the data on the time records are valid for about 3 years, with allowances for new drilling methods or practices which may have been developed in the meantime.

It is also important to remember, in using time summaries as estimating tools, that the records apply to a specific rig. Unit cost factors must be developed from historical records of each rig, and applied only to work done by that rig. This system has the dual advantages of contributing to more accurate bid estimates, and also providing a complete record of performance on each rig, since it records equipment failures and repairs classed by the unit of equipment.

Maintenance of historical time-records is becoming much more general in the drilling business as contractors learn that they take much of the guesswork out of estimating, and often point out distinctly the "reason why" for profit or loss on a given contract.

With its many uses, the time analysis summary can prove to be the drilling cost accountant's best friend: it is honest, faithful and true in good times and bad. **End.**

Atomic Experiments Develop Radiation-Resistant Lubricants

. . . Crosslinking has a profound effect on oil

WORK with irradiated lubricating oil is providing crosslinking and other information that may lead to greatly improved lubricants. Irradiation of lube oils has been conducted in England since 1953 in the Harwell experimental atomic pile and at the Thornton Research Center of the Shell organization.

In the development of nuclear-power applications the oil industry has a vital part to play. In addition to the conventional lubrication of generating and auxiliary equipment situated away from the nuclear reactor, moving parts located actually in the radiation field of the reactor also require lubrication. It is this latter aspect which poses new problems, since under such conditions the oil will be subjected to radiation consisting mainly of high-energy neutrons and gamma rays.

Crosslinking . . . These radiations have a profound effect on the structural and physical properties of an oil. The initial absorption of large amounts of energy from atomic radiations eventually results in crosslinking of the oil. The latter thickens and even solidifies, becoming hard and brittle.

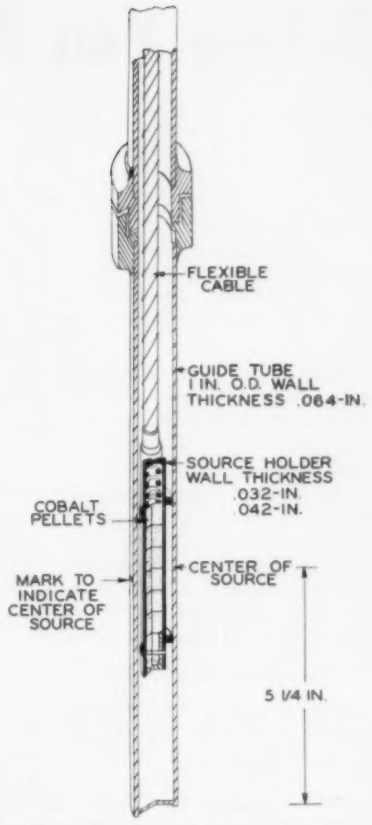
This phenomenon is not peculiar to hydrocarbon oils, but extends also to many synthetic oils such as silicone fluids. The effects of radiation on a large number of widely varied compounds have been studied, particularly in the field of plastics. Some synthetic resins, like polyethene and polystyrene, crosslink in the same manner as hydrocarbon oils upon irradiation, while others, such as polymethyl methacrylate degrade, and large decreases in viscosity take place in the liquid state. The problem of developing lubricants able to withstand the deleterious and complex effects of atomic radiations has systematically been pursued at Thornton Research Center of Shell Research, Ltd., in England since 1953. In collaboration with the U. K. Atomic Energy Research Establishment, many oils were irradiated inside "BEPO," the experimental atomic pile operating at Harwell. Oils and greases were exposed to gamma rays and neutrons for varying periods of time, and observations of the changes taking place have given a valuable insight into the factors determining the stability of lubricants under these severe conditions.

In addition to this work, a laboratory has now been built at Thornton, in which an intense source of gamma rays, in the form of 250 curies of radioactive cobalt-60, has been installed. Since the effects of gamma rays and neutrons on hydrocarbon oils are very similar, the source provides an important addition to the facilities available for studying the mechanism by which material changes take place during irradiation in an atomic pile.

Radioactive Source

A diagrammatic view of the Thornton radioactive source installation is shown in Fig. 1. The source consists of six pellets of cobalt-60, which are sealed in an aluminum capsule some 3 in. long and ½ in. in diameter. This capsule is contained in a stainless-steel cylinder of approximately the same dimensions, to which is attached a flexible steel cable. The latter moves the source within an outer guide tube which is positioned so that the source can be either in the exposed position in the radiation room or in the retracted (or safe) position in a bed of extra-dense concrete.

Irradiation . . . The samples to be irradiated are arranged around the source tube in specially designed glass tubes, so shaped as to make maximum use of the available radiation. A typical arrangement is shown in Fig. 1 where two tightly packed rings of tubes are placed in close proximity to the source of radiation. These tubes have flat walls, each tube fitting as closely as possible to its nearest neighbors. Unlike neutrons (which can convert sulfur in hydrocarbon oils to a radioactive isotope of phosphorus), gamma rays do not induce any radioactivity. Once the source has been retracted into the concrete block, it is safe to enter the radiation room and inspect the samples, which can then be taken away and their properties examined. During irradiation samples can be viewed through a mirror arrangement. Services like water, electricity, etc., are provided in the cell to enable experiments to be carried out under a wide range of conditions.


FLEXIBLE CABLE
GUIDE TUBE 1 IN. O.D. WALL THICKNESS .064-IN.
SOURCE HOLDER WALL THICKNESS .032-IN. .042-IN.
COBALT PELLETS
CENTER OF SOURCE
MARK TO INDICATE CENTER OF SOURCE
5 1/4 IN.

SECTIONED view of radioactive cobalt source in operating position. Fig. 1.

Results of Work

Information obtained from this work is proving invaluable in furnishing a better insight into the complex reactions which determine whether or not an oil is stable to the destructive effects of high-energy radiation. Already oils have been formulated to withstand high dosages of such particles and rays. Thus, 4 years ago the Shell organization was consulted about lubricating the nuclear power station at Calder Hall by C. A. Parsons & Co., Ltd., of Newcastle-upon-Tyne, contractors for the special plant necessary to harness atomic power at this station. A program of experimental work was launched at Shell's Thornton Research Center to evolve these special lubricants, and also to study the requirements of future nuclear power plants. As a result entirely new types of lubricant capable of withstanding very high temperatures and intense atomic radiation have been developed. These will undoubtedly find wider application in the coming atomic age. **End.**

Before You Buy—Try "Juggling"

Cosden utilizes existing equipment to fullest extent in cat cracker revamp. Equipment unable to meet new capacities is shifted into other services wherever possible. Result: minimum new equipment needed.

By Larry Resen

A CAREFULLY planned equipment-juggling program was used by Cosden Petroleum Corp. in expanding its cat cracking unit, at its Big Spring, Tex., refinery.

The reshuffling included vessels, compressors, pumps, and drivers on the cat cracking unit and also extended to other units to a limited degree.

As a result, the expansion job was done with a small amount for new equipment. Also, existing equipment was used more efficiently, thereby contributing to reduction in costs.

The latest revamp raised the capacity of the U.O.P. fluid cracking unit to 13,300 bbl. per day at 61 per cent conversion. This compares with an initial capacity of 6,000 bbl. at 50 per cent conversion, later raised to 9,000 bbl. at 60 per cent conversion.

Pumps and Drivers

One of the major juggling acts Cosden performed was in its handling of pumps and drivers. In the entire program, the engineering department attempted to make use of every possible piece of existing equipment. They even split pump and driver units to gain even a more efficient use of the equipment.

In the planning, all of the pumps and drivers on the unit were checked to see which could be retained in service under the new high-capacity conditions and which would be deficient. This latter group was then analyzed to see which of these could be used in a different service on the unit, and thus be relocated and kept in use.

For instance, in the fractionation section, the main-column distillate pump and its spare (F-P11 and F-P11a) had to be replaced. (Fig. 1). Two centrifugal pumps (250 g.p.m. at 760-ft. head) with 100-hp. motors were installed in place of the existing pumps (100 g.p.m. at 880 ft.). One of these was driven by a 60-hp. motor and one by a turbine.

The two replaced units were then used on the sponge-oil pump and spare (G-P9 and G-P9a) on the gas-concentration unit. The sponge-oil service was not identical to that performed by the main distillate pumps. However, this was solved simply by trimming the impellers on the pumps to fit the sponge-oil service requirements.

Of the two existing sponge-oil pumps, one was sent to salvage for possible future use in the plant. The second, a 250-g.p.m. at 80-psig. unit, was relocated to be used as a spare wash-water injection pump (G-P44a).

Another stepwise, progressive replacement situation involved the absorber bottoms pump (G-P41) in the gas-concentration section. A new centrifugal pump (350 g.p.m. at 142 ft. head) with 15-hp. motor was installed here. The existing centrifugal pump (225 g.p.m. at 235 ft. head) was relocated to serve as the spare main-column reflux pump (F-P10). Besides having its impeller trimmed, this pump was equipped with a 20-hp. driver in place of its existing 30-hp. motor. The 30-hp. motor was installed as the driver on the debutanizer reflux pump (G-P15a). This was a new centrifugal (360 g.p.m. at 300 ft. head).

The existing spare main-column reflux pump was transferred to salvage. However, its driver, a 12-hp. turbine, was relocated as the common spare (G-P42a) for the stripper pump (G-P42) and for the absorber bottoms pump (G-P41), where this particular juggling act all began. This common spare, incidentally, required a new pump.

In some cases, the replacement and relocation were less complex. Thus, a new centrifugal pump (225 g.p.m. at 235 ft. head) and 20-hp. motor were installed in the main-column reflux line in the fractionation section. The existing pump was relocated in the polymerization plant as a propane splitter reflux pump. The 15-hp. motor previously used with the existing pump was then used as the driver for the new primary absorber intercooler pump (G-P40) in the gas-concentration section.

Simplex or complex, all of the changes contributed to a lower total revamp cost. The extent of this pump and driver juggling may be seen in Fig. 1, where a layout shows the actual interchanges which were made. Table 1 shows portions of the work sheets used in scheduling these interchanges.

Other equipment . . . The juggling or use of existing equipment was extended to include some vessels, compressors, and heat exchangers as well as pumps and drivers.

For instance, while an existing compressor was not satisfactory for the new service, it was possible to use it in the thermal cracking unit. A new compressor was then installed.

The two first-stage 16-in. cylinders of this compressor were removed and a new 9¼-in. second-stage cylinder was installed. The two 16-in. cylinders were then installed on a new compressor purchased to handle the additional load. Two of these compressors were necessary for the new services. In both cases, an existing starting air receiver and two existing relief valves were used.

A new debutanizer was installed. The existing 5-by-52-ft. column was then used as a stripper. With the exception of replacing the existing top 12 bubble trays with new carbon-steel trays and installation of a new inlet distributor pipe, no changes were necessary. An existing compressor interstage receiver, meanwhile, was relocated in the thermal unit to serve as a suction drum for the compressor previously relocated from the gas-concentration unit.

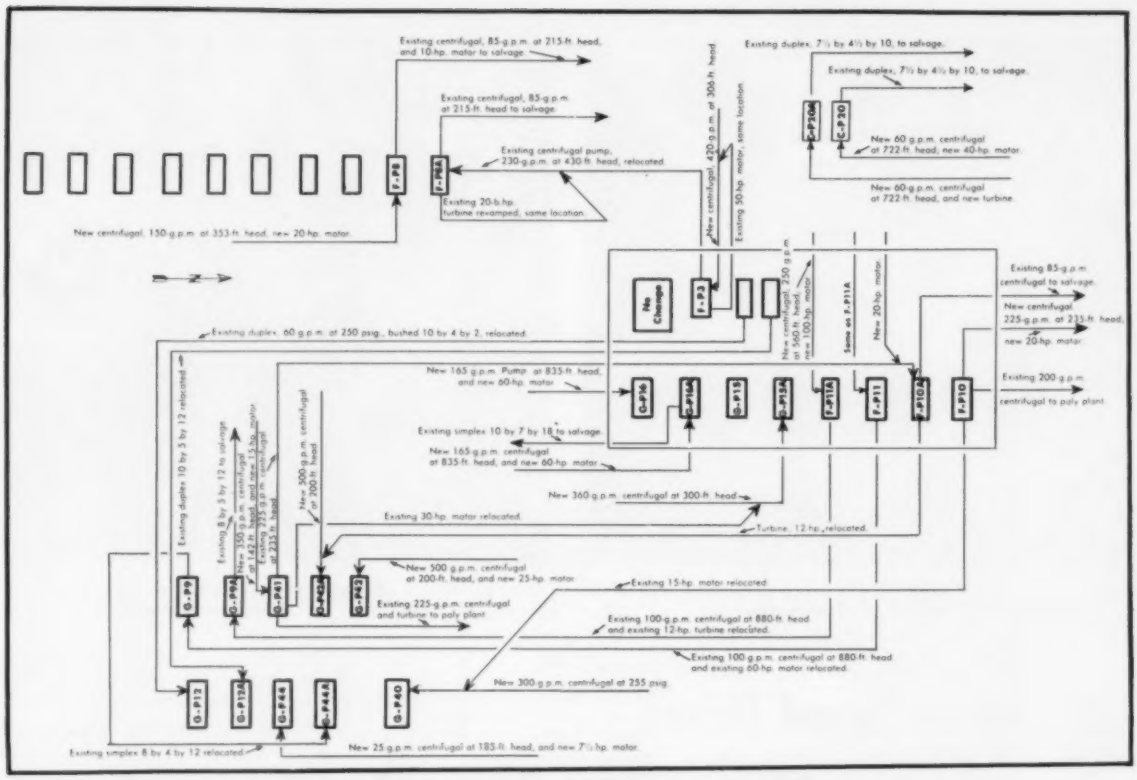
Much use was made of existing heat exchangers.

Use of existing equipment included upgrading of turbines. Two 12-hp. turbines were raised to 20 and 25-hp. ratings, respectively, by revamping them with parts furnished by the manufacturer.

Significance of Cosden's approach to its revamping program may be seen in a final recapitulation of surplus equipment. With all of the work and equipment entailed in the modification of the unit, only seven exchangers and seven pumps were transferred to surplus stocks. These have now been put into service at the Col-Tex and Hawley refineries.

Acknowledgments

The cooperation of the management of Cosden Petroleum Corp. is gratefully acknowledged as is the fine assistance rendered by E. B. McCormick, Jr., chief engineer, and E. H. Boullioun, Jr., project engineer.


Existing centrifugal, 85-g.p.m. at 215-ft. head, and 10-hp. motor to salvage.
Existing centrifugal, 85-g.p.m. at 215-ft. head to salvage
Existing centrifugal pump, 230-g.p.m. at 430-ft. head, relocated.
Existing 20-b.hp. turbine revamped, same location.
New centrifugal, 150-g.p.m. at 353-ft. head, new 20-hp. motor.
Existing duplex, 7½ by 4½ by 10, to salvage.
Existing duplex, 7½ by 4½ by 10, to salvage.
New 60 g.p.m. centrifugal at 722-ft. head, new 40-hp. motor.
New 60-g.p.m. centrifugal at 722-ft. head, and new turbine.
New centrifugal, 420-g.p.m. at 306-ft. head
Existing 50-hp. motor, same location
No Change
New centrifugal, 250 g.p.m. at 100-ft. head, new 100-hp. motor
Same as P-P11A
New 20-hp. motor
Existing 85-g.p.m. centrifugal to salvage.
New centrifugal, 225-g.p.m. at 215-ft. head, new 20-hp. motor.
Existing 200 g.p.m. centrifugal to poly plant
Existing duplex, 60 g.p.m. at 250 psig., bushed 10 by 4 by 2, relocated.
New 165 g.p.m. Pump at 835-ft. head, and new 60-hp. motor.
Existing simplex 10 by 7 by 18 to salvage.
New 165 g.p.m. centrifugal at 835-ft. head, and new 60-hp. motor
New 360-g.p.m. centrifugal at 300-ft. head
Existing 30-hp. motor relocated.
Turbine, 12 hp., relocated.
New 500 g.p.m. centrifugal at 200-ft. head, and new 25-hp. motor.
Existing 15-hp. motor relocated.
Existing 225-g.p.m. centrifugal and turbine to poly plant
Existing 100-g.p.m. centrifugal at 880-ft. head and existing 12-hp. turbine relocated.
Existing 100-g.p.m. centrifugal at 880-ft. head and existing 60-hp. motor relocated.
New 300-g.p.m. centrifugal at 255 psig.
Existing simplex 8 by 4 by 12 relocated.
New 25 g.p.m. centrifugal at 185-ft. head, and new 7½ hp. motor.

PUMP-AND-DRIVER WORKSHEET shows details of juggling program. Fig. 1.

Table 1—Detailed Breakdown, Pump and Driver Juggling.

Catalyst section: C-P20 and C-P20a—New steam generator condensate feed pumps. Centrifugal 60 g.p.m. at 722-ft. head with 40-hp. motor; 60 g.p.m. at 722-ft. head, with steam turbine. Replaces two existing 7½ by 4½ by 10 (surplus—60 g.p.m. at 230 psi.).

Fractionation section: F-P8—New stripped light-cycle oil pump. Centrifugal 150 g.p.m. at 353-ft. head with 20-hp. motor. Replaces existing 85 g.p.m. at 215-ft. head centrifugal with 10-hp. motor (surplus—85 g.p.m. at 216-ft. head). For spare use existing centrifugal, 230 g.p.m. at 430-ft. head. (P-3—raw-oil charge pump). Trim impeller for 150 g.p.m. at 353-ft. head. Spare driver will be revamped 20-b.hp. turbine from existing P-8A. Replaces existing centrifugal 85 g.p.m. at 215-ft. head. (P-8A) less turbine driver (pump surplus—85 g.p.m. at 216-ft. head).

F-P3 — New raw-oil charge pump — centrifugal 420 g.p.m. at 306-ft. head, with pump, base, and coupling. Driver will be existing 50-hp. motor from existing charge pump (P-3). Existing centrifugal 230 g.p.m at 430-ft. head charge pump to F-P8A above. Pump will operate without spare. Will charge unit direct from charge booster on cutback when F-P3 is down.

F-P11 and F-P11a — New main-column distillate pump and spare. Two centrifugal pumps 250 g.p.m. at 360-ft. head pumps with 100-hp. motors. F-P11 replaces existing centrifugal 100 g.p.m. at 880-ft. head, 60-hp. motor. Replaced centrifugal 100 g.p.m. at 880-ft. head and motor relocated for sponge oil pump (G-P9) at gas-concentration section.

Replaced spare centrifugal 100 g.p.m. at 880-ft. head and turbine relocated for spare sponge oil pump (G-P9a) at gas-concentration section. Impellers on two centrifugal 100 g.p.m. at 880-ft. head pumps to be trimmed for G-P9 and G-P9A service.

F-P10—New main-column reflux pump. Centrifugal 225 g.p.m. at 235-ft. head with a 20-hp. motor. This replaces existing centrifugal 200 g.p.m. at 235-ft. head (P-10) which is to be replaced, less motor, as poly plant propane splitter reflux pump. The 15-hp. motor from existing P-10 will be used as driver for new primary absorber intercooler pump (G-P40) gas-concentration section.

For spare use (F-P10a) use existing centrifugal 225 g.p.m. at 235-head absorber bottoms pump (P-14) with new 8¼-in. alloy impeller (less existing 30-hp. motor) with new 20-hp. motor. This spare replaces existing centrifugal 90 g.p.m. at 235-ft. head (P-10a) less turbine. Turbine will be revamped and used as driver for new spare stripper charge pump (C-P42A), gas-concentration section. Centrifugal pump less driver surplus (90 g.p.m. at 235-ft. head). All other existing fractionation section pumps as is.

Gas-concentration section: G-P9 and G-9A —Relocate sponge oil pump and spare. For this service use existing centrifugal 100 g.p.m. at 880-ft. head with 60-hp. motor (main-column distillate pump—P11) and for spare use existing centrifugal 100 g.p.m. at 880-ft. head with turbine (P-11a). Trim impellers for 130 g.p.m. at 625-ft. head.

G-P12 and G-P12a—Relocated interstage condensate pump and spare. For this service use existing duplex 60 g.p.m. at 250 psig. sponge oil pump (P-9). For spare use existing duplex 10 by 5 by 12 spare sponge oil pump (P-9A).

G-P15 and G-P15A—Debutanizer reflux pump. For this service use existing centrifugal 300 g.p.m. at 300-ft. head debutanizer overhead pump as is. New spare pump, centrifugal 360 g.p.m at 300-ft. head with pump, base, and coupling. For driver use existing 30-hp. motor from absorber bottoms pump (P-14). Spare replaces existing duplex reciprocating 10 by 7 by 16 (surplus—retire).

G-P16 and G-P16A—New propane splitter feed pump and spare. Each pump centrifugal 165 g.p.m. at 835-ft. head with 60-hp. motor (New service).

G-P40—New primary absorber intercooler pump, centrifugal 330 g.p.m. at 255 psig. with pump, base and coupling. For driver use existing 15-hp. motor from main-column reflux pump (P-10). (New service—no spare).

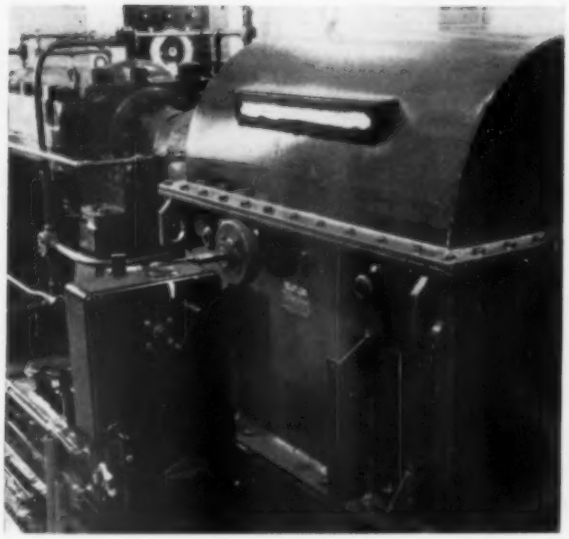
G-P41 — New absorber bottoms pump, centrifugal 350 g.p.m. at 142-ft. head with 15-hp. motor. Replaces existing centrifugal 225 g.p.m. at 235-ft. head. (P-14). This pump, with trimmed impeller, less existing 30-hp. motor, with new 20-hp. motor, to be used as spare main column reflux pump (F-10A). New common spare with G-P42, spare replaces centrifugal which as complete unit with turbine will relocate as poly splitter reflux pump spare.

G-42 and G-P42A—New stripper charge pump, centrifugal 500 g.p.m. at 200-ft. head with 25-hp. motor. New common spare for stripper charge pump and absorber bottoms pump, centrifugal 500 g.p.m. at 200-ft. head with pump base and coupling. For new spare driver use revamped turbine from P-10A (25 b.hp.).

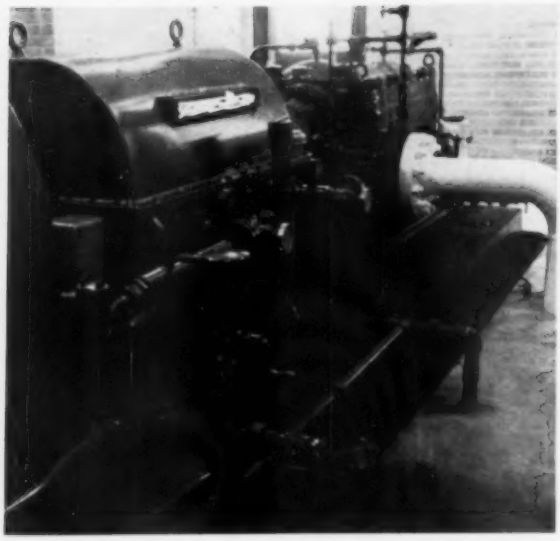
G-P44 and G-P44A — Wash-water injection pump. New centrifugal 25 g.p.m. at 185-ft. head with 7½-hp motor. For spare use existing simplex 25 g.p.m. at 80 psig 8 by 4 by 12 (P-12, interstage condensate pump).

Turbines revamped: F-P8A—12 hp. from P-8A, to 20 hp. (parts from manufacturer).

G-P42A—12 hp. from P-10A, to 25 hp. (parts from manufacturer).



900-HP. VARIABLE-SPEED fluid drive is shown here with pneumatic control drive which controls pump speed.



COOLING LINES and connections to fluid drive are shown in this view of drive and pump. The 900-hp. induction motor is at left.

Let Variable-Speed Drives

Lower Your Pipeline Pumping Costs

Savings of 10 per cent of total power costs are not exceptional

By F. A. Moore

PIPELINE pumping station power and maintenance costs can be reduced by the use of variable-speed drives.

As more and more automatic unattended and remote-controlled pumping stations are being built, it has become very important to design these stations for simplicity of operation and reliability. Maintenance costs should be as low as possible. Power costs make up a large share of the operating expenses on most pipelines. Power costs often can be cut by the use of a variable-speed drive between a constant-speed motor and a pump.

Squirrel-cage induction motors and centrifugal pumps have been accepted throughout the industry because of lower first costs, reliability, ease in adaptation to out-of-door installations and in hazardous atmospheres. They also have many advantages for unattended operation that other prime movers do not have.

Author is supervisor, engineering department, with Ohio Oil Co. pipeline department, Findlay, Ohio.

Need for Control

Some type of pressure and/or flow control is necessary at most pumping stations for the following reasons:

- Line protection. Developed pressure by the pump plus possible high suction pressures often exceed the line design pressure.
- Pump protection. Much damage can be done to a pump if it runs out of fluid. Suction pressure must be kept above a specified minimum.
- Closed-system line. A variation of the first two reasons. Each station must pump all of the fluid as it arrives (thereby eliminating tankage at intermediate points along the pipeline).
- Flexibility. A station should be as flexible as possible to handle variable rates of flow desired due to various drawoff points, changes in viscosity, specific gravity, seasonal fluctuations, etc.

Ohio Oil Co.'s experience shows that large variations in flow are needed in a products line. The addition of one station at the hydraulic midpoint of a line will increase the line capacity by approximately 40 per cent. This is usually too large an increase in capacity to be used immediately. It is seldom practical or economical, with automatic or unattended stations, to install more than one unit or to pump at higher rates and shut the line down for a day or two each week.

Several units are never practical in the case of small-diameter lines, say through 10-in. Therefore it has been necessary to either install throttling valves or some means of controlling pump speed.

Fluid-Drive Efficiency

The efficiency of the variable-speed fluid drive varies directly with the ratio of output speed to input speed. At half speed, the efficiency of the drive equals 50 per cent. In addition to this loss, due to the ratio of output and input speed, there are certain small fixed losses. The centrifugal-pump in-

put, b.hp., however, varies directly as the cube of the speed. Power savings, therefore, increase rapidly as the pump speed is reduced.

Fig. 1 shows typical curves for one pipeline section with one pumping unit. Both the line characteristic and pump characteristic curves are shown. The constant speed b.hp. curve has been plotted and also the variable speed b.hp.

Assume the pump is operating at 100 per cent rated capacity at 100 per cent rated pressure H_1. The power used b.hp.$_1$ would be approximately the same for the constant-speed unit as for the variable-speed unit.

If, however, it is desired to reduce the flow to 80 per cent of the rated capacity, pressure H_2 is all that is required. The variable-speed drive will reduce the pump speed to form a new characteristic curve intersecting the line characteristic curve at the desired pressure capacity condition H_2. If the pumping unit is a constant-speed unit, it will generate pressure H_3 at the new desired capacity. The desired capacity can be achieved only by throttling off the pressure between H_3 and H_2 (ΔH as shown). The power used by the constant-speed unit is shown on the curve at b.hp.$_3$ The variable-speed unit requires power b.hp.$_2$ Therefore, considerable power is saved over throttling at all capacities under the maximum.

Fluid-drive horsepower losses rise as the output speed is decreased and reach a maximum at about two-thirds full speed. These losses then become lower as the speed is decreased still further. The maximum horsepower losses are approximately 16 per cent of the full load. These losses are included in the variable speed b.hp. curve shown in Fig. 1.

Savings of 25 per cent of the total costs of power are to be expected in these cases.

Crude-Line Application

The fluid drive also can be used on larger crude-oil pipelines where several pumping units per station are desirable or necessary.

Power savings in these cases do not represent as large a percentage of the total power bill as they do in the case of one-unit stations on small-diameter lines. The dollar savings per month, however, may be much higher.

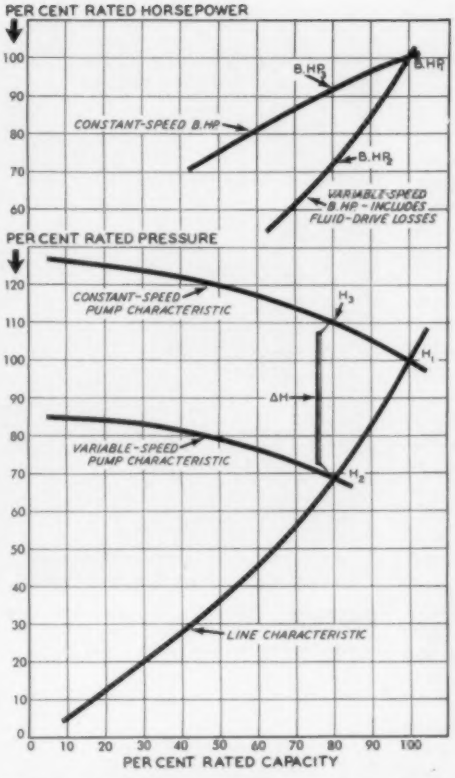
Assume a pumping station consisting of three 2,500-hp. motor-driven centrifugal pumps on a large-diameter crude-oil pipeline. Complete flexibility of flow and pressure with no throttling losses is possible by using a variable-speed fluid drive on one of the three units. In operation, the variable-speed unit is started first. It will generate any desired pressure up to its maximum, at which time the second unit is started and the variable-speed unit slows down.

If more pressure is needed, the variable-speed unit speeds up. If full speed will not generate the desired pressure, the third unit is started and again the variable-speed unit slows down or adjusts its speed to give exactly the desired total station pressure. All of the above, of course, is easily accomplished with automatic controls. Actually, with the three-unit station on a crude line, flow will not change enough to warrant starting and stopping units as inferred above.

Since the maximum fluid-drive losses are about 16 per cent of full-load horsepower, and since only one of the three units need be variable speed, total losses are low as compared to total station horsepower. In this case, 16 per cent of 2,500 hp. = 400 hp. possible loss out of 7,500 total horsepower. If the three units develop 1,000 psi. at full capacity, the maximum loss possible would be equal to throttling 53 psi.

$$\frac{400 \text{ hp.}}{7{,}500 \text{ hp.}} = \frac{x \text{ psi.}}{1{,}000 \text{ psi.}}$$

$$x = 53 \text{ psi.}$$



POWER SAVINGS over throttling are indicated by curves for one pipeline section with one pumping unit. Fig. 1.

AUTOMATIC CONTROL panel, pneumatic control panel, and auxiliary motor load center.

Power Savings

Therefore, if average throttling on the line segment would be more than 53 psi., the fluid drive would reduce power costs. It can be seen that throttling due to differences in gravity of crude oil only will amount to more than 53 psi.

Deliveries of crude oil along a trunk line necessitates changes in the pressure generated at a station from time to time. Changes in delivery schedules also force changes in pressures generated. Savings of 10 per cent of the total power costs are not exceptional with large multiunit stations.

The fluid drive will pay out rapidly over a throttling valve in power savings alone in many applications. These units also will offer savings due to:

1. **Fewer units per station** needed for desired flexibility.

2. **Lower maintenance costs.**

3. **Fluid-drive fixed losses** usually are less than losses across a fully open throttling valve.

New Equipment Had to When P.C.I. Revamped

Replaced equipment was reused elsewhere, which

MUCH has been written about close planning on revamp-expansion jobs. But perhaps no other required such close planning as the expansion made by Petroleum Chemicals, Inc., at its Lake Charles, La., butadiene facilities. In October 1955, P.C.I. awarded the expansion contract. This expansion was to be in the nature of bottleneck removals and was to increase the plant capacity by approximately 20 per cent.

The plant is quite compact. And the problem in revamping existing equipment and piping, and installing new equipment to operate in parallel with existing equipment, offered a challenge not often encountered. A period of approximately 14 months was required from initial design and material procurement to job completion.

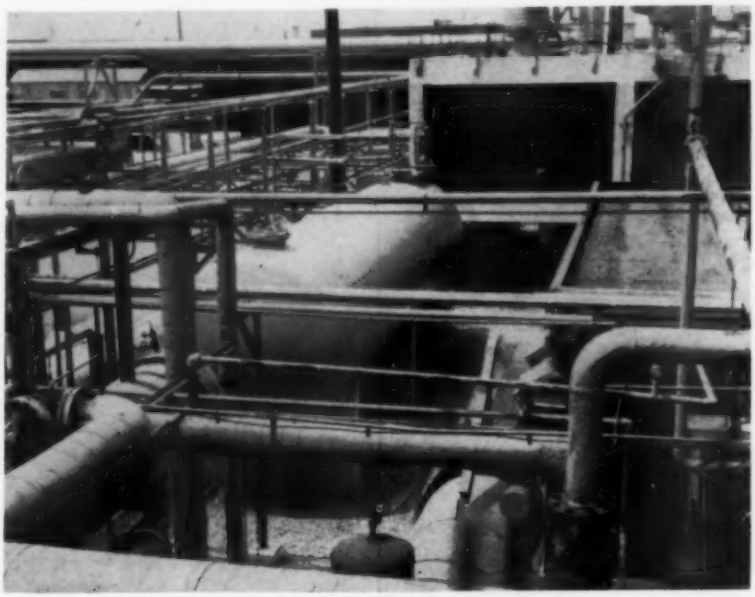
Scheduling of the revamp work to fit in with the plant operating schedules and the annual maintenance shutdown required very close planning and cooperation. This was complicated by the fact that almost all the equipment which was replaced by new was reused elsewhere in new services. Such utilization of old equipment was carried out even to the extent of reusing control valves and gate valves where possible.

Extensive safety precautions were required to permit construction work in the operating areas without interfering with operations. Sources of possible gas leaks were, of course, blanked off. Firemen, safety men, and operators stood by as fire watchers. Procedures were established to make "hot work" permits available to the contractor with a minimum of lost time. Contractor on the job was Fluor Corp.

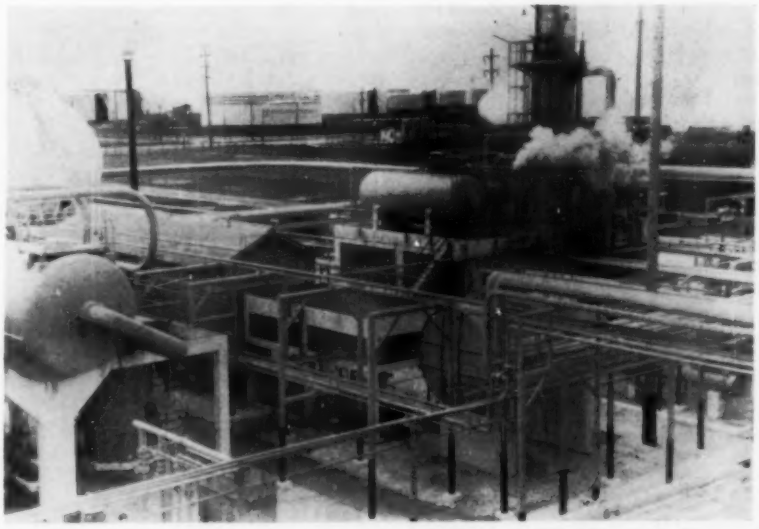
1—Lake Charles Facilities

Basically, this plant converts butylenes to butadiene by catalytic dehydrogenation and extracts the butadiene with cuprous ammonium acetate solvent.

In the **feed preparation** section isobutylene is removed from the mixed hydrocarbon feed by sulfuric acid with settling out of the resultant "fat acid." The isobutylene in the fat acid is polymerized to a dimer and separated from the acid and the latter is recycled. Meanwhile, the isobutylene-free hydrocarbon feed is caustic-washed and rerun to insure removal of acid-polymer. Butylene is separated from butanes by extractive distillation with acetone-water solution in a butylene extraction column. Acetone solution and butylene leave the bottom of the butylene extractor column and the butylene is separated in a butylene stripper. Butylene is water-washed

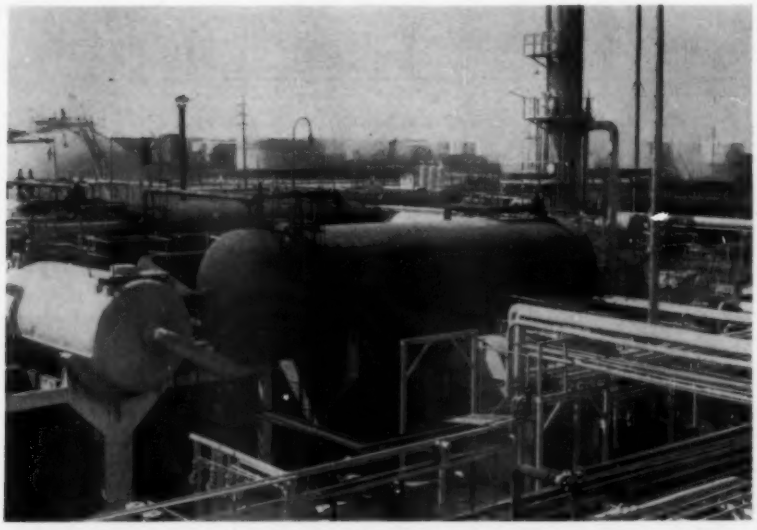


BEFORE This 10 by 45-ft. horizontal drum at Petroleum Chemicals, Inc., Lake Charles butadiene plant was moved to clear a 28 by 65-ft. area for installation of towers, equipment, and pump room shown in AFTER photo at right.



BEFORE A horizontal drum was moved and a building demolished to make room for three horizontal and two vertical drums in butadiene extraction section.

AFTER Two towers and auxiliary equipment were installed in gas-recovery area between the existing building (behind towers) and existing pipe racks in foreground.



AFTER Here are the three horizontal drums installed in space vacated by equipment shown in photo at left. It took precise planning, but it was successfully done.

Be "Shoehorned in" at Lake Charles

complicated the bottleneck-removal operation

and is now ready for the dehydrogenation step.

Acetone is recovered from the butylene stripper and butylene water-scrub towers. The butane is also water-washed to recover acetone.

In the **dehydrogenation** section conversion of butylene to butadiene takes place with steam over a catalyst. Reactants and steam are cooled quickly, go through an oil scrubber to remove heavy polymers, and the steam is condensed and hydrocarbon vapor further cooled. Catalyst in the reactors is regenerated with superheated steam.

In the **gas-recovery** section, the vapor portion of the reactant stream is compressed, cooled, and uncondensed vapors go through oil absorption for addtional recovery of C_4.

In the **butadiene extraction and purification,** the butadiene is extracted with cuprous ammonium acetate solution from the unconverted butylene, butane and a small amount of isobutylene. The extraction is carried out in a countercurrent mixer-settler system at low temperature. Butadiene is released from the solvent by heating in a desorber tower, is water-washed, condensed by ammonia refrigeration, and goes to the rerun tower for final purification.

2—Work Involved

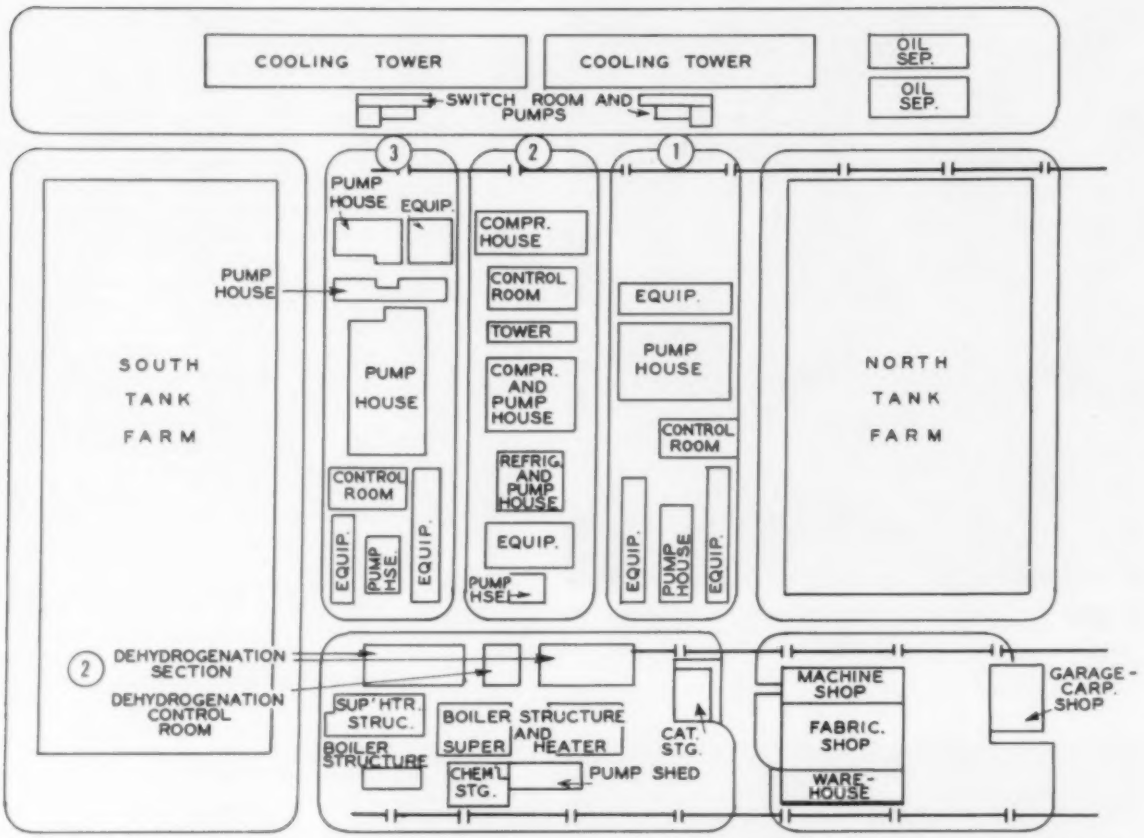
The above brief process description gives some idea of the facilities as they were employed before P.C.I. began the expansion. The plant consists of three major process areas: (1) Feed preparation, (2) dehydrogenation and gas recovery, and (3) butadiene extraction and purification; and there are three utility sections—steam generation, refrigeration, and cooling water. These areas are indicated in the plot plan, Fig. 1. This is the plot plan as it existed in the government plant before P.C.I. took over and made the revamp-expansion.

Scope of work . . . The revamp included the following major items:

1. Feed-preparation area. Install a new tower (12 ft.-6-in. diameter by 149 ft. high); an 8-ft. 6-in. by 30-ft. drum; nine heat exchangers; three pumps; and a pump room.

2. **Gas-recovery area.** Two towers (5 ft. by 70 ft. and 2 ft. by 53 ft.); 3 drums, a 1,370-hp. centrifugal compressor; revision of the heat-exchange system involving installation of 2 rectangular exchanger boxes containing 4 tube bundles of 39,800 and 5 tube bundles of 26,700 sq. ft. of surface, and 11 conventional shell-and-tube exchangers; 4 pumps; and 2 pump rooms.

3. **Butadiene extraction and purification area.** A 7 by 48-ft. tower;



THIS PLOT PLAN of the original butadiene plant, BEFORE changes were made by P.C.I., increased the capacity by removing bottlenecks. Main process areas indicated are: (1) feed preparation; (2) dehydrogenation, compression, and gas recovery; and (3) butadiene extraction and purification.

three 13-ft. 6-in. by 60-ft. settler drums, two 9 by 15-ft. mixer drums, one 6-ft. 6-in. by 9-ft. mixer drum; 4 exchangers; 10 pumps; and a pump room.

4. **Refrigeration area.** Two drums; a 1,565-hp. centrifugal ammonia compressor; and four exchangers.

Additional work . . . This required: (1) replacement of an existing condenser with a larger condenser, (2) replacement of a 6-ft. 6-in. by 12-ft. 6-in. stripping column with another of improved design, (3) revamp of two rectangular condenser boxes and installation of new tube bundles to increase surface area from 14,700 sq. ft. each to 26,700 sq. ft. each, and (4) revamp of piping of twelve 10 by 30-ft. settler drums in series to convert to two parallel banks of six drums in series, and (5) replacement of several pumps with larger pumps.

Reusing equipment . . . Wherever a piece of equipment was replaced, an attempt was made to use this equipment elsewhere. In this manner, six 36-in. diameter exchangers were reused, three 4 by 8 by 16-ft. 3,300-tube condenser bundles, several motors and motor starters, several pumps, and a large number of control valves and gate valves—all were employed in new services. This of course complicated the over-all planning since one phase of the work could not be completed until equipment was made available by the completion of another phase of work.

This gives an idea of the scope of the work in the compact areas shown in Fig. 2. Even the space occupied by equipment which was to be moved was to be reused by additional equipment to be installed; where possible existing foundations were adapted to fit the new equipment.

3—Planning the Revamp—Four-Stage Job

The difficult problem of placing the new equipment was planned as a four-stage program in this order:

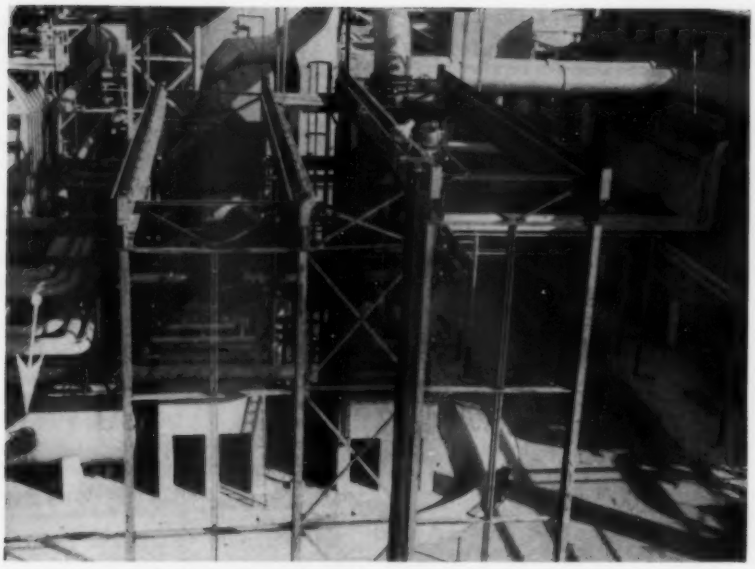
1. **Clearing areas during plant operation.** This was accomplished by the plant maintenance department during January-February, 1956.

2. **Moving equipment with shutdown of given area.** This included moving of pipelines so that existing pump rooms could be extended and the relocation of exchanger equipment.

3. **Scheduling of the new installations to tie in with the annual plant-maintenance shutdown.** The annual shutdown takes place in the spring. During this shutdown the contractor would do all work possible to minimize any future shutdown.

4. **Leaving a final short shutdown of the three major process areas to tie in all the new equipment.** This was facilitated by providing stubouts on existing piping wherever possible so that new lines could be tied into existing lines during operation. In this way the time required for the final shutdown was reduced.

Preliminary design engineering . . . The contractor began a separate over-all plant process study immediately after the contract was awarded. Even before the process study was completed, the contractor began preliminary design engineering and sent out for bids on equipment. The first process flow sheets were submitted by the contractor to the plant for approval around January 1, 1956. Flow



MANWAY PROBLEM—Arrow points to boxes installed in gas recovery area. Note manway on end of horizontal drum. This manway could not be opened and a new manway (see arrow) was installed at side of drum.

sheets were checked by plant engineers and returned to the contractor for revision in a short time. Meanwhile, knowing the approximate quantity of materials required, sizes of various pieces of equipment, etc., the contractor had already issued letters of intent and purchase orders to vendors.

This procedure was taken in order to tie up critical materials and obtain early delivery on the equipment. As the design work progressed and revisions were made, the equipment specifications were revised also; this information was relayed to the vendor immediately.

4—Making the Revamp

A careful survey was first made to establish just where the new equipment could be located in order to fit in with existing equipment and operations and still be practical from a construction standpoint.

Clearing areas . . . In many cases it was necessary to move existing equipment in order to make room for the new equipment. As much as possible of the moving was done while the plant was still in operation. Some large equipment was involved and it was often a rather tight squeeze. In one case, an 8 by 12-ft. vertical drum was removed to clear an area approximately 22 by 30 ft. in which two exchanger boxes, 10 by 18 by 33 ft., and a 10 by 18 by 26-ft., were installed. It turned out that the foundation of one of the condenser boxes was so close to a manway in the end of a nearby horizontal drum that the manway could not be opened. It was necessary to install a new manway in the side of the drum.

Area shutdown . . . There were several instances in which existing equipment could not be moved except during a shutdown of the particular area. In the butadiene purification area, for example, a 44-in.-diameter shell-and-tube exchanger at the end of a series of 13 exchangers had to be relocated to the opposite end of the train to make room for the installation of a new 60-in.-diameter refrigerated cooler in its place. The moving of the 44-in.-diameter exchanger had a dual purpose. It cleared a space for the 60-in.-diameter cooler. It also cleared a space inside the battery limits into which a crane could be moved to get close enough to the pump room to set a 7-ft.-diameter by 48-ft.-high, 19-ton tower, and a 54-in.-diameter, 17-ton condenser on top of the pump room.

Walking the crane in . . . This job was done by setting the tower up in the road, picking it up with the crane, and walking the crane directly into the hole with the tower in front of it. The tower was then raised to clear the pipe racks in front of the line of exchangers and until it was high enough to set on top of the building. The tower was then skidded on greased rails to its proper position on top of the building. The crane then backed out of the hole, picked up the condenser, walked back into the hole, and set the condenser on top of the building. While in the hole, the clearance was so close that the crane could not turn through more than a 10° arc.

Sleeved holes . . . The foundation design for the tower was novel in that, instead of the conventional anchor bolts projecting from the concrete, sleeved holes were left through the roof of the building. The anchor bolts were then inserted through the holes after the tower was in place and bolted to the bottom side of the roof using 1-in.-thick steel-plate washers to clamp the tower to the roof.

Tiein with plant shutdown . . . Relocation of certain piping and equipment, and work on the refrigeration unit and cooling-water circulating system was to be done during the scheduled annual general plant shutdown for maintenance.

Stubouts . . . To reduce the amount of welding and necessity of purging, blinding, etc., during the final short shutdown, stubouts were provided by the plant maintenance forces during the scheduled annual turnaround. The flow sheets were carefully studied, line by line, and the lines on which the stubouts were to be installed were listed. In some cases, valves were to be installed on the stubouts, and in others only a blind flange was provided. A total of approximately 97 of these stubouts were listed, ranging in size from ¾ in. up to 24 in., and including utility connections as well as process connections.

The list was surveyed by the mechanical forces to see which of the stubouts could be installed during operations and which could be done only during the general shutdown. Where the line could not be taken out of service during operations, the flanged nozzle was welded to the outside of the existing line. This saved doing the welding during the shutdown, so that during the shutdown it was necessary only to cut out the opening in the existing line. Approximately 50-60 per cent of the stubouts were installed in this manner, thus saving many man-hours during the shutdown.

Where the stubouts could not be installed in this manner, the nozzles were prefabricated and placed in the field at the location where they were to be welded in. The existing lines were stripped of insulation and the cutout laid out and center-punched, ready for cutting and welding during the shutdown. All valves for the connections were placed on the ground or on scaffolds at the locations in which they were to go, packed

and tagged, together with their gaskets, bolts, and blind flanges.

Safety procedures . . . Each day while the units were in operation the contractor submitted to the job engineer a list of the safety permits he would require for the following day. Then each day the safety inspectors and operating department prepared the hot-work permits. Firemen strung out fire hoses and stood by in case of fire. Operators checked the area and also stood by as fire watchers.

To permit this hot work in the operating areas required extensive preparation. All trenches which had only steel cover plates were covered over with tarpaulins and a 3 to 4-in. layer of sand in an attempt to obtain a gas tight seal. All sewer manholes were covered over. Where the work was close to a pump room, tarpaulins were hung to enclose completely the side of the pump room so that in case of a gas spill the gas would not go out into the welding areas.

During the shutdown the contractor worked two 10-hour shifts and the plant maintenance forces three 8-hour shifts. Originally the contractors' work day began at 7:30 a.m. and the plant operators, foremen, and safety men changed shifts at 7:45 a.m. But the contractor changed his starting time to 8:00 a.m. so that he could receive his work permits and "fire up" **after** the shift change and its resulting confusion. Whenever there was any work to be done which might involve the release of any gas into the area, this work was scheduled between the hours of 2:30 a.m. and 6:00 a.m. when the contractor was not working. In this manner work stoppage was eliminated as much as possible.

Partial shutdowns . . . Work was now directed toward a short shutdown of the three major operating areas approximately 4 months later. But it became evident that it would be difficult to make a simultaneous shutdown of all units. It was then decided to make partial shutdowns of individual units for short periods of time, in order to bring some of the equipment on stream ahead of other equipment. Plans were made for an 8-hour shutdown of the gas-recovery section to tie in the new 10 by 18 by 33-ft. and 10 by 18 by 26-ft. condenser boxes and to install valve stub-outs.

Replacing pumps . . . The work which required the most time was replacement of two pumps. These were 440-volt-drive pumps which were replaced with 2,300-volt pumps. Before the shutdown the foundations of the existing pumps were excavated all around. The existing foundation blocks were then drilled and doweled, and an additional 8 in. of new foundation poured around the old foundation. The 2,300-volt switchgear was installed and made ready, the motor lead conduit installed, and the wires pulled. Then during the shutdown the pumps, motors, and base plates were removed, new base plates installed, and the pump and motor set to fit the existing piping.

The suction and discharge lines on the pumps were full of liquid hydrocarbons up to the valves at the pumps, so the valves were blinded off while the work proceeded. This shutdown took longer than 8 hours, but the work was completed at 4:00 a.m. the following morning.

Butadiene extraction area . . . The next partial shutdown was in the feed-preparation and the butadiene-extraction and purification sections. The major job was in the latter section. Here piping had to be revised on the bank of twelve 10-ft.-diameter by 30-ft.-long drums to make two parallel banks of six drums in series per bank. These two parallel banks were then to be placed in series with the three new 13-ft. 6-in. by 50-ft. drums. A number of pumps were also to be replaced and relocated, with revisions in the piping.

In order to minimize delays, the three new vessels in the butadiene-extractor area which had been installed on their foundations during the early stages of the job were piped up to the first valve nearest the vessel as quickly as possible after installation of the vessels. Temporary piping was then installed by the P.C.I. forces and the drums were used for storage of the cuprous ammonium acetate solvent which would be required for operation.

This system is a closed solvent circulating system, holding a fixed volume of solvent. The three new vessels increased the capacity of the system, requiring new solvent to be made up. Since ths solvent is made up by the batch process, several weeks were required to make up enough solvent for the three vessels.

Low-temperature unit . . . Also, since the extraction unit is a low-temperature unit, operating well below 32° F., it was recognized that the insulation of the new piping would delay startup unless the piping could be tested and insulated before shutdown. Of particular concern were several long runs of 14, 12, 4, and 3-in. piping, each approximately 150 ft. long. Flanges were installed in the line, as close as possible to the tiein point, so that the lines could be tested and insulated before the shutdown.

To keep production losses at a minimum and get the unit into operation as fast as possible, the work was concentrated to complete half of it during the first week. Half of the extraction unit could then be brought on stream and placed in operation while waiting for the second half to be completed.

Again the contractor went to two 10-hour shifts, this time in the butadiene-extraction and purification area. The work scheduled for the first week was completed and that half of the unit was started up over the weekend so that startup would not interfere with the contractor's work during the second week. The following week work was resumed in this area and the butadiene - purification revisions were also completed.

The contractor then turned toward winding up the uncompleted jobs. It was now possible to bring all uncompleted units on stream during operation because these were valved off where they tied into the existing piping and no further shutdowns would be required.

In summary . . . Because of production commitments, feed-stock availability and limited storage facilities, the work was pushed to completion as outlined here.

It is of course realized that there are drawbacks to a job of this kind. It is difficult to check drawings sufficiently and a large number of field revisions are necessary. The plant forces had very little time to check flow sheets since construction was proceeding so rapidly. The operating department continued to run their units while also closely following the construction in the field and comparing it with existing equipment and operations.

This close cooperation of the P.C.I. operating and maintenance forces with each other and with the contractor, who had to take some calculated risks on this job, made possible the successful completion of the revamp.

Acknowledgment

Appreciation is expressed to personnel of Petroleum Chemicals, Inc., and in particular to Mack Abraham, who was primarily involved in following the engineering of the butadiene-plant revisions and who wrote most of this report.

Bruce K. Brown is president of Petroleum Chemicals, Inc.; F. M. Simpson is vice president; D. H. Olehy is manager of operations; H. L. Malakoff is technical manager; and L. D. Grubb is regional manager at Lake Charles.

Canadian vs. American

OIL TAXATION

Part 2

By A. G. Burton

FOR A NUMBER of years the Canadian Government refused to permit unused expenditures to be transferred from one corporation to another. However, in 1956 a new section was enacted in the Income Tax Act which permits the carryover of these expenditures provided the purchasing corporation acquires all, or substantially all, of the Canadian properties of the vendor company.

There are, however, certain restrictions; for instance, these expenditures can only be used by the purchasing company against income received from the properties so acquired. The word "income" is neither defined in the act as a whole, nor is it defined within this section. The word is used in various parts of the Income Tax Act and at times with different meanings.

Since this section is so new, there has not yet been any jurisprudence in connection with it, and therefore we do not know whether the word income means gross income, income after charging lifting costs, or net income. This can make a very substantial difference in the interpretation of this section.

While we may appear to be critical of this section of the act, the reasons behind it are fairly sound. Parliament quite properly did not intend a corporation to buy the physical assets of another, where the predecessor corporation had spent a considerable amount of money to no avail and had not developed any properties to a productive stage.

If a protective provision were not in the act, then a company which had spent say a million dollars and obtained substantially nothing but dry holes, would be in a position to sell this loss for a substantial sum, and the loss which they could never use themselves would then in turn be used to reduce government revenues from another corporation.

While we are inclined to agree with this approach, we also feel that a more definite set of rules should have been laid down within this section and that the proper approach is to define the word income as being gross revenue in this particular instance.

In order to take advantage of this provision the purchasing company must issue its shares to the vendor company for its assets, or it must issue its shares to the shareholders of the other corporation, thereby acquiring the second corporation as a wholly owned subsidiary. In the latter case the subsidiary must then be wound up and liquidated and the properties transferred into the successor corporation.

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Capital Gain vs. Taxable Gain

Canada has no capital-gains tax. This comment usually brings an expression of joy to the eyes of most Americans, and we in Canada wish we could agree with that expression. Since the revenue department does not receive any tax whatsoever from a capital gain, it is most anxious to determine that any profitable transaction is not a capital gain, in which case it becomes a taxable gain and is taxed at ordinary rates.

Particularly for individuals, this can amount to a very substantial tax which, on occasion, is almost confiscatory. While the underlying law has not changed, the taxation authorities have recently been tightening up their practice, and assessing as income those gains which, in the past, were looked upon as nontaxable capital gains.

As stated earlier, in the realm of oil taxation, the government will not permit a bona fide oil corporation to charge to expense the cost of acquiring acreage. However, whenever an oil company sells some acreage at a gain the tax authorities are prone to try to figure out a reason why they should be permitted to charge tax against it.

High risk factor . . . Due to the high risk factor in the oil industry it is, of course, very common to operate in joint ventures with one or more other parties in order to share the risk. If a company has acquired a piece of acreage which appears on the surface to be very desirable, and it is not prepared to put all its eggs in one basket and prefers to have others join in the cost of exploration and drilling, then quite frequently a situation arises where part of that property is sold to certain other parties who thereby assist with the development costs.

It sometimes happens that the time between the original acquisition of the property and the farmout or joint venture agreement with other parties to assist in developing the property may be relatively short, since operations must sometimes be carried out very quickly in this business. In such cases the Canadian tax department has taken the stand that the property was acquired for resale and that therefore the company entered into the business of buying and selling lands.

They might point out that land was purchased one month and was resold the following month; on numerous occasions, our courts have looked to the articles of incorporation of the company and found that these articles included, among other powers, the power to buy and sell property.

Following this line of thinking, the department has asked for tax on this gain, entirely ignoring the fact that when property is acquired in the oil business, at no time has it been permitted as an expense.

Because a capital gain tax is not levied, Canadians normally don't report items which, in their opinion, give rise to capital gains. Of course, in the case of corporations, such gains are always shown in either the income or the surplus accounts, and therefore are set forth at the time of filing the tax return.

In the case of individuals, who do not show these gains (believing them to be capital gains) they sometimes are picked up several years later, due to the high rate of tax, plus 6 per cent interest per annum, situations could arise where the tax in the final analysis is greater than the gain.

Interest on Unpaid Tax

We might point out here that any unpaid tax is subject to 6 per cent per annum interest charge, and this interest is not allowed as an expense for income-tax purposes. This can be likened to a normal 12 per cent charge and is therefore very expensive. Commencing January 1, 1957, the statute of limitations for reassessment of tax returns was reduced from 6 years to 4 years provided there is no fraud or misrepresentation.

This may mean, therefore, that in normal circumstances the maximum interest charge will be 24 per cent as opposed to the previous 36 per cent; this really represents an effective interest charge of 48 per cent as opposed to the previous 72 per cent. However, one must consider that the

statute of limitations runs from the date of the assessment notice, and if the original notice is not issued until some period of time after filing the tax return, then the statute will start running from that time, whereas interest commences from the date on which the tax return must be filed. This can make a very great difference.

We have mentioned before that if an oil company has exploration and drilling expenditures in excess of its income, then it just charges off those expenditures to the extent of that income, bringing its chargeable income to nil, and carrying forward the excess expenditures to future years. Due to the nature of the oil business, a company may operate for several years before it finally is in a position where its revenue is in excess of its expenditures, and it is only in this year that it will first pay tax.

Take a case . . . Let us say that it takes a company 10 years to reach this stage, and this is far from unrealistic. During the first 9 years it will show no tax payable. But there may be a considerable number of items which are open to some doubt as to whether or not they are permissible as tax deductions; similarly, certain items considered to be capital gains are also open to doubt. Under Canadian tax law there is no way in which the company can obtain a final assessment during the first 9 years in order to clarify its carry-forward position.

This means, therefore, that the only assessment that this company will receive is the one which it receives for the tenth year; it is only at that time that the company can go to court in connection with any arguments which it may have in regard to previous years' expenses or income. This can result in a definite hardship to management, which is trying to plan cash flow and general financing, and is not sure when it enters the tax orbit.

Oil Payments Out

In the United States the so-called oil-payment method of financing has been used to a very real extent. This method has helped to bring funds into the hands of the petroleum industry, which in turn can be used for further exploration. Unfortunately in Canada it is not feasible to use this method because of our tax laws.

If an oil payment of 1 million dollars is purchased in Canada, the purchaser has acquired an asset which is considered to be land by the taxing authorities and therefore it cannot be charged off, in any manner, against the income from production.

In view of this, if the purchaser receives 1 million dollars of production he will be allowed $333,333 as depletion, and will pay tax on the balance of $666,667 at the rate of 47 per cent if a corporation. This amounts to a tax in excess of $300,000 and to this extent the purchaser would not recoup his initial investment.

If cost depletion were allowed, then the initial payment would be charged off against the revenue as it comes out of the ground and consequently there would be no profit or loss; there is, of course, a profit on these transactions which represents an interest factor, and to the extent of such interest the purchaser would receive his depletion and pay tax on the two-thirds left. Many people, mostly in the United States but occasionally in Canada, have wanted to know why they cannot use the oil-payment method of financing in Canada.

Depreciation

By and large, Canadian depreciation regulations are more favorable than those in the United States. Substantially all depreciation, other than amortization of leasehold improvements and other relatively minor items, is computed on the reducing balance basis. When this method was put into effect in 1949, the previous straight-line rates were substantially doubled. All oilfield equipment at the wellhead is permitted a 30 per cent rate, as are automobiles and trucks. A great majority of other equipment is depreciated at a 20 per cent rate.

If all items of one class are disposed of, leaving a balance which is undepreciated after applying the selling price as a credit to the asset, then that balance may be claimed as an expense in that year. Conversely, if after applying the selling price as a credit to the asset a net credit position results, then that net credit is added to income, or an election may be made to spread that income back over the previous 5 years.

Spreading such excess back over a 5-year period normally makes little or no difference to a corporation unless there has been a definite change in corporate tax rates, but it usually represents a saving to an individual who is paying tax on a graduated basis.

Leeway in depreciation . . . Also the Canadian regulations give considerable leeway in the amount of depreciation which is claimed in any one year. The taxpayer has the right to claim anywhere from zero to the maximum amount which is allowed by regulation. If he claims less than the maximum amount, he cannot pick up the excess in a lump sum in one subsequent year but since depreciation is computed on a reducing-balance basis it means the following year he is applying his rate against a higher undepreciated capital cost figure, and therefore over a period of years he will pick up any depreciation which he did not claim in earlier years. This can be quite beneficial to an organization having trouble in absorbing a loss position within the 5-year term of carry forward of losses.

Dividend Depletion

In our discussions above in regard to depletion, we have been discussing depletion insofar as the producer is concerned. We should point out, however, that in some instances depletion is also granted to persons who receive dividends from oil companies. For a company doing business in Canada, the investor may deduct 10 per cent depletion from his dividend where the mineral profits of the corporation are equal to not less than 25 per cent, but less than 50 per cent; the rate is 15 per cent if the mineral profits are not less than 50 per cent, but are less than 75 per cent; and the allowance is 20 per cent if the mineral profits are not less than 75 per cent.

If the corporation is not carrying on business in Canada the depletion allowance of 15 per cent of the dividend is granted if the mineral profits of the corporation are not less than 50 per cent of its income. The words "mineral profits" of course include petroleum, natural gas, and production from mining enterprises.

Another privilege . . . The Canadian investor who is paying tax on his investment income in Canada also has the privilege of deducting 20 per cent of his dividend income from his income tax. In this case dividend income is after deducting depletion allowance. His dividend income, less depletion, is added to his ordinary income, on which tax is computed, and then from that tax he deducts 20 per cent of his dividend income, less depletion.

Since the Canadian corporation tax is 20 per cent on the first $20,000 and 47 per cent on the excess, this provision in effect permits the Canadian investor to recoup the double taxation feature at the 20 per cent rate, which results in a substantial benefit to the tax payer.

As this article was being finished, the new Government of Canada has announced that it proposes to make certain changes in the tax laws regarding depletion for the petroleum industry. This could well result in canceling some of the criticisms voiced above. **End.**

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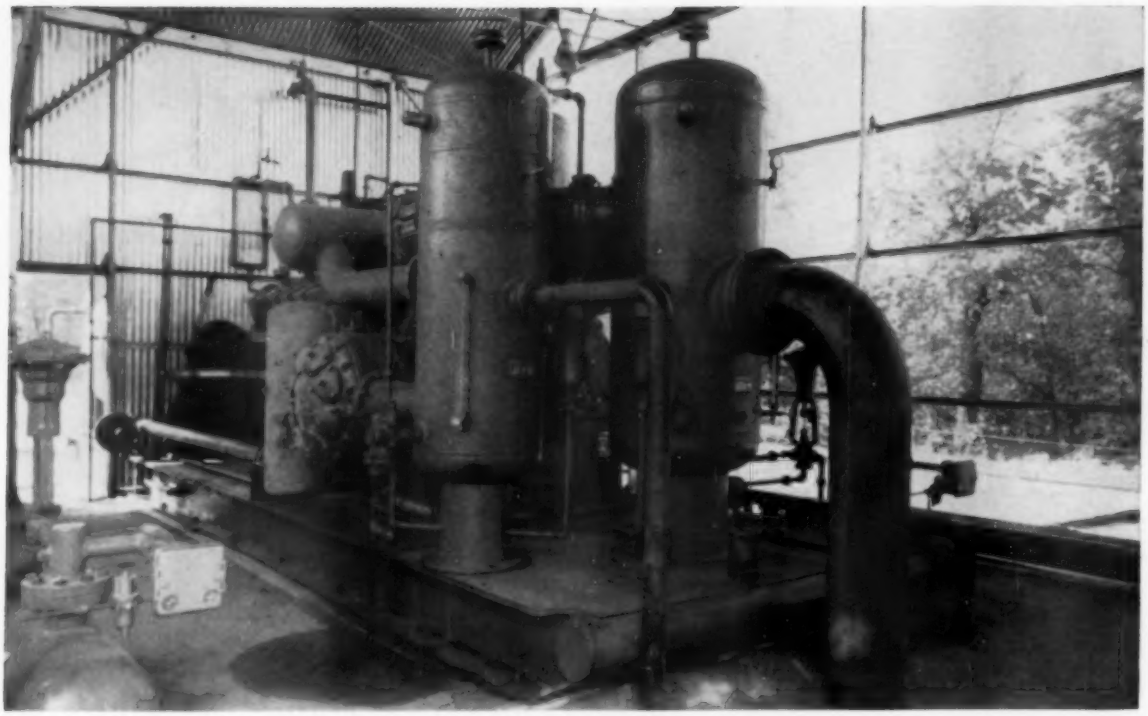


ROAD-SIZE PORTABLE COMPRESSOR with reduced intercooling and boiling-water heat exchange costs three-fourths as much as conventional compressors. Capacity is about 750 M.c.f.d.

Installation is simple, operation is reliable, and best of all . . .

Ebullient Cooling Cuts Costs

By J. O. Scott
District Editor

SINCLAIR OIL & GAS CO. is finding removal of heat from engine lube oil by boiling water improves mobility, simplifies installations and improves reliability of gas-engine-driven compressors. The company's first application of this new practice was begun June 23, 1956, in a two-unit gas-booster plant near Drumright, Okla. In this plant Climax V-122 gas engines are used to drive Joy three-stage compressors. The compressor cylinders are operated without cooling water and engine cooling is accomplished by a conventional ebullient cooling system. The ebullient cooling of the lube oil is accomplished by passing the engine lube oil through a heat-exchanger section in the bottom of the conventional steam and water separator.

Although the booster has been in operation only a short time, the following advantages of this system are indicated:

Reduced cost and simplified installation . . . Condensing equipment requires less heat-exchange surface than liquid-cooling equipment. Eliminated are water pump, V-belt drive, extra piping, use of temperature controls and other accessories necessary for a standard cooling system.

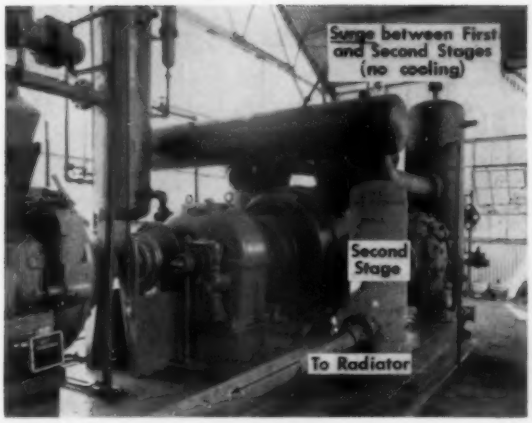
Lower temperatures in cylinder walls and pistons . . . The rate of heat transfer is faster by ebullient cooling than with conventional methods.

More reliable operation . . . Since the number of components required to do the job is reduced and simplified, there is less possibility of a shutdown due to a cooling-system failure. Since the rate of heat transfer is faster, maximum overloads can be imposed without overheating the engine.

Lower maintenance costs . . . Ebullient cooling slows down the buildup of calcium and other deposits in the engine jackets. It also reduces the rate of buildup of carbon and mineral salts on piston rings, exhaust ports, cylinder heads, etc. Keeping the oil at temperatures above the boiling point of water precludes the condensation of water in the lube oil and prevents harmful corrosion from crank-case acids. Wear on moving parts is reduced because at the higher temperature of the lube oil, viscosity is reduced and lubrication improved.

Less control effort . . . Removal of heat by boiling water is fast and positive. The only controls required for the entire system is a low-water-level shutdown and a reliable pressure-relieving device.

Uniformly controlled temperatures . . . Since the engine heat is removed by water at its boiling point, the temperature of the engine jacket and lube oil will remain constant regardless of



COMPRESSION is from field-gathering system at 20-in. vacuum. Three stages bring gas up to 350 psi. With no cooling between first and second stages the gas reaches 385° F., is cooled to 130° F. after second stage.

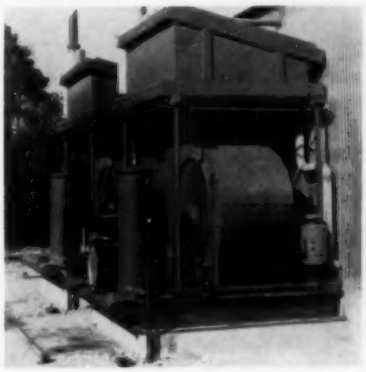
COOLING SYSTEM operates at boiling point of water which is 225° F. with slight pressure. Lubricating oil is maintained at 250° F. Steam leaves header, passes through air cooler, and returns as condensate.

the load or atmospheric temperature. This will permit closer fits in the engine parts and reduce thermal distortion. Lubricating oil may also be developed for the specific operating temperature.

Improved mobility . . . The medium-speed engine and compressor means that for a given horsepower considerable less weight of cast iron is used. Medium-speed units such as this have better dynamic balance which permits a reduction in the weight of skid and foundation required for stability. This better dynamic balance is important in the reduction of the required width of the compressor installation. This particular skid is 8 ft. wide which is the maximum permissible width of load that can be hauled without special permit on Oklahoma highways.

Shortly after Sinclair began operating this booster station some difficulty was met in the compressor cylinders that operate without cooling water. But today the defects appear to have been corrected satisfactorily.

The unit was fabricated to Sinclair Oil & Gas Co.'s specifications by McNamara Boiler & Tank Co., of Tulsa, Okla. Close cooperation between Sinclair engineers and engineers from McNamara, Joy Manufacturing Co., and Climax Engine & Pump Mfg. Co. have made this application possible. Lubricating oil for the unit was developed by Sinclair engineers.

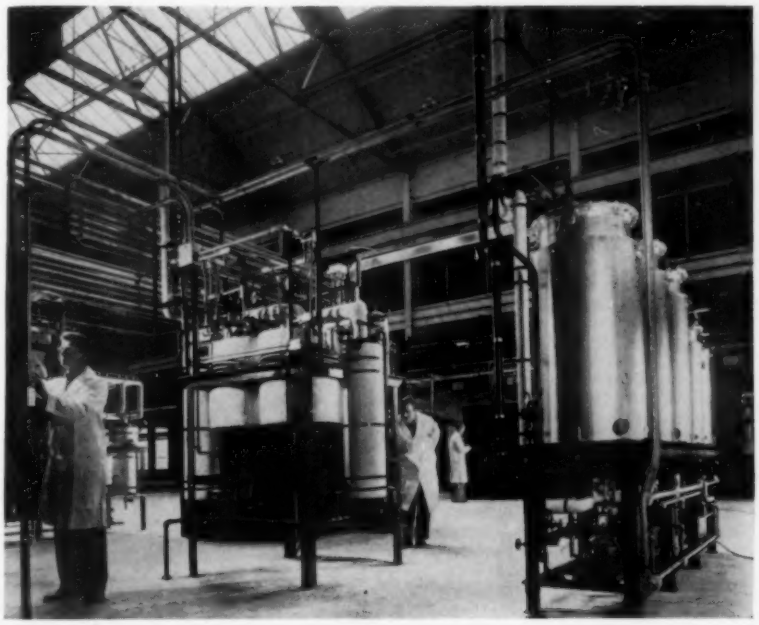


AIR COOLER blows air past radiator where steam condenses. Thermosiphon action provides circulation of water without need of a pump.

New Engineering Center Houses Offices, Shops

ADEQUATE room for the many pilot plants which comprise the bulk of facilities at the new engineering development center of Lummus Co. which is located at Newark, N. J., bridges the gap between the research laboratory and the commercial processing. The 150,000 sq. ft. of space required last year gives Lummus plenty of new room for serving its customers.

Pilot-plant runs are made here on distillation, solvent extraction, delayed coking, hydrogen treating, catalytic cracking, polymerization, and other processes. On many jobs, it is possible to project actual yields of commercial units to within 0.01 per cent from samples ranging from 1 cc. to a tank car. The center also houses analytical laboratories, offices, and a complete machine shop.



NEW engineering development center of Lummus Co. at Newark, N. J.

Part 2—See August 5 issue for Part 1 (How Pure Geology Works at Natchez).

Natchez Area Production

By G. W. Gulmon, H. E. Hansen, and B. L. Simms

WILCOX oil fields in the Natchez area usually are small in area, but highly prolific. Recoveries of 800-1,000 bbl. per acre-ft. of pay are common. The shallow to intermediate drilling depths, low drilling costs, and high recoveries make the Natchez area particularly attractive to independent operators.

Detailed stratigraphic studies are the key to finding these small Wilcox oil fields. Certain markers are extremely valuable for structural mapping, but in the final analysis, stratigraphy controls production. The same statement holds true for the Tuscaloosa play now shaping up in both Louisiana and Mississippi.

Mississippi Oil Fields

Field (location, county), discovery—	Type	No. wells	Prod. Nov. 1956 (bbl.)	Development
Anna (8n-2w, Adams), Lyle Cashion Co.	Nose trap	1	1,222	Incomplete
Bude (5n-4e, Franklin), The California Co., Barnsdall	Strat trap (Tuscaloosa)	2	1,174	Depleting
Buena Vista (5n-4e, Franklin), Atlantic Refining Co.	Pinchout (Tuscaloosa)	1	*0	Abandoned
Beaver Branch (5n-1w, Adams), Rimrock-Tidelands, Inc.	Structural nose	2	3,307	Incomplete
Butler Lake (5n-3w, Adams), John S. Callon	Strat trap	1	1,875	Complete
Carthage Point (Tuscaloosa) (6n-3w, Adams), Pure Oil Co. (gas condensate)	Deep-seated salt dome	5	7,245	Complete
Carthage Point (6n-3w, Adams), Vaughey & Vaughey	Low-relief closure	3	956	Complete
North Carthage Point (6n-4w and 7n-4w, Adams), Billups Bros. and Sunnyland Contracting, Inc.	Pinchout on nose	5	13,629	Incomplete
Church Hill (9n-2w, Jefferson), Robert Oil Co. and Lyle Cashion Co.	Closure	32	71,951	Complete
North Church Hill (9n-2w, Jefferson), Calto Oil Co. and G. W. Gulmon	Structural nose	4	8,638	Complete
Commencement (5n-2w, Adams), Barnett Serio and Calto Oil Co.	Low-relief closure	8	18,955	Incomplete
Cooper Hill (6n-1w, Adams), John S. Callon, T. J. Glennon, and Wilson-Davis Drilling Co.	Low-relief closure	2	2,023	Complete
Courtland (5n-1w, Adams), Barnett Serio Drilling Co.	Strat trap	2	2,103	Incomplete
Cowpen Point (7n-2w, Adams), Humble Oil & Refining Co.	Small closure	4	10,956	Incomplete
Cranfield (Tuscaloosa) (7n-1w, Adams and Franklin), The California Co.	Deep-seated salt dome	88	65,626	Complete
Cranfield (Wilcox) (7n-1w, Adams), The California Co.	Structural closure	26	31,693	Complete
Darrington (4n-2w, Wilkinson), Calto Oil Co.	Pinchout on nose	8	21,995	Complete
Deerfield (5n-1w, Adams), Calto Oil Co., G. W. Gulmon, Sim C. Callon	Low-relief nosing	2	3,794	Incomplete
Dixie (5n-1e, Franklin), Calto Oil Co. and G. W. Gulmon	Lens on regional nosing	1	1,798	Incomplete
Doloroso (4n-2w, Wilkinson), H. L. Rowley, Inc.	Structural nosing	1	2,448	Incomplete
Ellislie (5n-3w, Adams), Sohio Petroleum Co.	Pinchout	2	813	Incomplete
Southeast Ellislie (5n-2w, Adams), Hunter Jones and Jett Drilling Co.	Structural nosing	2	3,368	Incomplete
East Fairview (4n-4w, Adams), Humble Oil & Refining Co.	Structural closure	9	11,331	Incomplete
Fayette (Wilcox) (9n-1e, Jefferson), Humble Oil & Refining Co.	Structural closure	32	21,510	Complete
Fayette (Tuscaloosa) (9n-1e, Jefferson), Humble Oil & Refining Co.	Salt dome	5	7,172	Complete
South Fayette (9n-1e, Jefferson), Sinclair Oil & Gas Co.	Pinchout trap			Abandoned
Flat Rock (5n-1e, Franklin), Barnett Serio Drilling Co.	Pinchout trap	4	3,528	Complete
Fort Adams (1n-4w, Wilkinson), J. M. Harper, Jr.	Strat trap	1	422	Complete
Forrest Home (8n-1w, Adams), John S. Callon	Wilcox closure	5	3,750	Complete
North Freewoods (5n-1e, Franklin), Sunnyland Contracting Co.	Pinchout on nose	8	18,719	Incomplete
Garden City (4n-1e, Franklin), Gulf Refining Co.	Pinchout trap	1	1,184	Complete
Gardens (7n-2w, Adams), Humble Oil & Refining Co.	Pinchout trap	6	9,800	Incomplete
Glen Aubin (5n-3w, Adams), Barnett Serio-Petersen Drilling Co.	Trap on Wilcox nose	4	2,356	Incomplete
Homewood (7n-3w, Adams), E. C. Wentworth	Strat trap	2	756	Complete
Idlewilde (8n-1w, Jefferson), Lyle Cashion Co.	Low-relief Wilcox structure	18	37,352	Complete
Ireland (4n-1w, Wilkinson), Gulf Refining Co.	Pinchout Wilcox nose	4	1,223	Complete
Jeanette (6n-1w, Adams), John S. Callon	Pinchout	4	2,218	Incomplete
Kelly Hill (4n-1w, Wilkinson), Calto Oil Co., and G. W. Gulmon	Structural nosing	4	12,629	Incomplete
Kingston (5n-2w, Adams), Plains Production Co.	Strat trap	26	40,991	Complete
North Kingston (5n-2w, Adams), J. P. Evans	Pinchout	2	1,579	Incomplete
South Kingston (5n-2w, Adams), John S. Callon	Strat trap	1	2,196	Incomplete
Knoxville (5n-1e, Franklin), J. Paul Ratliff, Jr., and Petersen Drilling Co.	Strat trap	3	2,708	Complete
North Knoxville (5n-1e, Franklin), Billups Bros., and John Player	Strat trap	1	1,551	Incomplete
Knoxville Tower (5n-2e, Franklin), H. L. Hunt	Pinchout trap	2		Abandoned
La Grange (7n-2w, Adams), Sohio-Roeser & Pendleton	Pinchout, Wilcox nose	106	132,808	Incomplete
South La Grange (6n-2w, Adams), Harry Elliott and Kemp Drilling Co.	Low-relief Wilcox structure	32	43,008	Complete
Lake Lucille (4n-3w, Adams), Humble Oil & Refining Co.	Wilcox closure-low-relief	1		Abandoned
North Lake Lucille (4n-3w, Adams), Humble Oil & Refining Co.	Structural nosing	1	2,518	Incomplete
Lake Mary (3n-4w, Wilkinson), Jett Drilling Co. and David L. Sadler	Sharp structural nosing	15	33,575	Incomplete
Laurel Hill (5n-3w, Adams), Norman Germany, G. W. Gulmon, and Eagle Drilling & Development Co.	Structural nosing	1	1,476	Incomplete
North Lessley (3n-3w, Wilkinson), Barnett Serio-Petersen Drilling Co.	Pinchout trap			Abandoned
Levees Creek (5n-1w, Adams), Jett Drilling Co.	Small closure	9	16,566	Complete
Locust Hill (5n-1w, Adams), Dorris Ballew and John S. Callon	Small closure	4	7,962	Complete
West Locust Hill (5n-1w, Adams), Serio-Punches Oil Co.	Wilcox closure			Abandoned

Mississippi Oil Fields (continued)

Field (location, county), discovery—	Type	No. wells	Prod. Nov. 1956 (bbl.)	Development
Mandamus (5n-2w, Adams), John S. Callon and D. A. Biglane	Wilcox closure	7	15,146	Incomplete
Mills Bayou (4n-3w, Wilkinson), Serio-Punches and Como Drilling Co.	Strat trap	1	764	Complete
Moorland (5n-1w, Adams), Barnett Serio	Small closure	3	2,464	Incomplete
Moss Grove (7n-1w, Adams), Calto Oil Co. and G. W. Gulmon	Strat trap	1	1,381	Incomplete
Mud Creek (3n-1w, Wilkinson), Calto Oil Co.	Structural nosing	2	5,856	Incomplete
Natchez (Tuscaloosa) (7n-3w, Adams), Humble Oil & Refining Co.	Strat trap	1	937	Complete
North Natchez (7n-3w, Adams), Humble Oil & Refining Co.	Small closure	4	5,028	Incomplete
New Era (6n-3w, Adams), Barnett Serio Drilling Co.	Pinchout trap	1	854	Incomplete
Oakwood (8n-1w, Jefferson), Eagle Drilling Co., Jett Drilling Co., and R. H. Alagood	Strat trap	3	4,928	Incomplete
Oldenburg (7n-2e, Franklin), Hawkins & Graham	Small Wilcox closure	7	4,139	Complete
Overton (5n-2w, Adams), Lee Oil & Exploration Co.	Pinchout, Wilcox nose	21	50,949	Incomplete
North Overton (5n-2w, Adams), William Helis	Small closure	3	2,909	Incomplete
Pellucid Bayou (5n-1w, Adams), Kemp Drilling Co.	Small Wilcox closure	..	....	Abandoned
Pine Ridge (8n-2w, Adams), Phillips Petroleum Co.	Pinchout, Wilcox nose	12	15,701	Complete
Poplar Grove (6n-2w, Adams), Serio-Punches Oil Co.	Structural nosing	6	15,670	Complete
Possum Corner (4n-2w, Wilkinson), Southern Production Co.	Small Wilcox closure	4	1,197	Incomplete
South Possum Corner (4n-2w, Wilkinson), Gulf Refining Co.	Pinchout trap	1	666	Incomplete
Reeves (6n-2w, Jefferson), Jett Drilling Co. and Robert Oil Co.	Strat trap on nosing	1	1,184	Incomplete
Rodney (10n-1w, Jefferson), Southern Production Co.	Tuscaloosa structure	1	*0	Complete
Rodney Island (10n-12e, Jefferson) (Tuscaloosa), Heep Oil Co.	Pinchout on nosing	4	12,936	Incomplete
Saukum (3n-1e, Wilkinson), Gulf Refining Co.	Pinchout trap	1	....	Abandoned
Shieldsboro (4n-3w, Adams), Humble Oil & Refining Co.	Strat trap	2	1,601	Incomplete
Sibley (5n-3w, Adams), Humble Oil & Refining Co.	Wilcox structure	32	37,900	Complete
Soapstone (2n-1w, Wilkinson), Serio-Punches Oil Co. and T. J. Glennon	Strat lens	1	792	Complete
Stanton (8n-1w, Adams), Austin E. Stewart	Pinchout	†2	....	....
Sunnyside (8n-1w, Jefferson), J. Willis Hughes	Small Wilcox closure	14	29,279	Complete
North Sunnyside (8n-1w, Jefferson), John S. Callon	Strat trap	1	1,497	....
Vernon (8n-2w, Adams), Dave Gammill and Lyle Cashion Co.	Pinchout trap	1	239	Complete
Wayside (5n-1w, Adams), Magnolia Petroleum Co.	Pinchout	11	8,191	Complete
Wells Creek (5n-1e, Franklin), John S. Callon	Structural nosing	7	17,894	Incomplete
South White Apple (5n-1e, Franklin), Lyle Cashion Co.	Pinchout	5	2,391	Incomplete
Wilkinson (3n-2w, Wilkinson), Gulf Refining Co.	Pinchout	1	*0	Abandoned
Woodlands (6n-4w, Adams), John S. Callon	Structural nosing	6	5,402	Complete
Freewoods (4n-1e, Franklin), Lion Oil Co.	Pinchout on nose	2	3,646	Complete
North Fayette (10n-1w, Jefferson), Jett Drilling Co.	....	1	599	Incomplete

*Shut down. †Gas wells.

Louisiana Oil Fields

Field (location, parish), discovery—	Type	No. wells	Prod. Nov. 1956 (bbl.)	Development
Bayou Cocodrie (4n-8e, Concordia), Hunt Oil Co.	Pinchout	2	695	Complete
North Bayou (Cocodrie (5n-8e, Concordia), H. L. Hunt et al.	Pinchout	2	1,081	Complete
Bee Brake (4n-7e, Concordia), Hunt et al.	Pinchout	22	32,541	Complete
Big Bayou (6n-5e, Catahoula), Hunt	Pinchout	2	3,098	Complete
Black Hawk (2n-8e, Concordia), Jett Drilling Co.	Pinchout	2	2,557	Complete
Brabston (4n-8e, Concordia), Jett Drilling Co.	Pinchout on nose	2	4,661	Complete
Clayton (8n-10e, Concordia), Billups, Gauthier & Heard	Pinchout on nose	9	17,077	Complete
Deer Park (5n-9e, Concordia), Carter Oil Co.	Small Wilcox nose	1	221	Complete
Esperance Point (5n-9e, Concordia), Sinclair Oil & Refining Co.	Low-relief Wilcox clos.	48	137,807	Incomplete
Fairview (4n-9e, Concordia), Sinclair Oil & Refining Co.	Large Wilcox closure	14	28,965	Incomplete
Harrisonburg (9n-7e, Catahoula), Trans-Tex Drilling Co.	Struc. nose-pinchout	10	14,557	Complete
Holly Ridge (Tuscaloosa) (11n-10e, Tensas), Carter Oil Co.	Deep-seated salt dome	23	25,319	Complete
Horseshoe (6n-7e, Concordia), Billups Brothers-Vasser & Brown	Small Wilcox closure	4	7,520	Complete
Justina (Tuscaloosa-Gas) (12n-10e, Tensas), Michel T. Halbouty	Strat trap (Tuscaloosa)	1	*0	Incomplete
Lake Formosa (Tuscaloosa) (12n-10e, Tensas), Jett Drilling Co.	Strat trap	2	*0	Incomplete
Lake St. John (9n-9e, Concordia and Tensas), The California Co.	Deep-seated salt dome	174	188,178	Complete
Larto Lake (5n-5e, Catahoula), Carter Oil Co.-Phillips Petroleum Co.	Structural nose	6	8,611	Incomplete
South Larto Lake (4n-5e, Catahoula), H. L. Hunt	Structural nose	6	6,652	Incomplete
Lismore Landing (6n-7e, Concordia), H. L. Hunt	Pinchout on nose	11	13,359	Complete
Locust Ridge (gas) (10n-11e, Tensas), H. L. Rowley	Strat trap-Tuscaloosa	3	§0	Incomplete
Locust Ridge (oil) (10n-11e, Tensas), Southern Natural Gas Co.	Strat trap-Tuscaloosa	22	52,309	Incomplete
Milestone Forks (8n-10e, Concordia), Durbin Bond, Petersen and Union	Pinchout nose	7	11,495	Complete
Newlight (13n-10e, Tensas), Chicago Mill & Lumber Co.	Strat trap	6	12,224	Incomplete
Patton Church (8n-6e, Catahoula), H. L. Rowley, Inc.	Struc. nose-pinchout	3	*0	Incomplete
Pool Lake (8n-7e, Catahoula), Austin Stewart-Pan American Southern Corp.	Pinchout trap	2	†0	Complete
Quinn Bayou (5n-8e, Concordia), Jett Drilling Co.	Pinchout	1	1,456	Incomplete
Rifle Point (8n-10e, Concordia), Serio Drilling Co.	Pinchout	1	592	Incomplete
Rodney Island (10n-12e, Tensas) (Tuscaloosa), Heep Oil Co.	Pinchout trap	15	39,564	Incomplete
Roseland (4n-9e, Concordia), Carter Oil Co.	Wilcox closure	7	13,206	Complete
Ross Bayou (6n-7e, Concordia), Serio Drilling Co.	Wilcox nose	24	42,264	Complete
Saline Lake (5n-5e, Catahoula), Hunt Oil Co. et al.	Strat trap	19	32,306	Complete
North Saline Lake (5n-5e, Catahoula), Hunt Oil Co. et al.	Strat trap	7	9,837	Complete
Sicily Island (9n-7e, Catahoula), The California Co.	Salt dome	1	1,507	Complete
Tew Lake (8n-6e, Catahoula), Durbin Bond & Co.	Strat trap	5	‡5,372	Incomplete
Vidalia (7n-10e, Concordia), R. A. Campbell and Buffalo Drilling Co.	Pinchout	6	7,225	Complete
Waverly Point (7n-10e, Concordia), E. C. Wentworth and Como Drilling Co.	Strat trap	2	1,105	Complete?
Wildsville (7n-6e and 7e, Concordia), Serio Drilling Co.	Pinchout	8	5,041	Complete
Wisner (11n-7e, Franklin), Shell Oil Co.	Strat trap (Tuscaloosa)	2	1,972	Incomplete
Normandy (7n-7e, Concordia), Estate of William G. Helis	Strat trap	1	*0	Incomplete

*New field. †Temporarily abandoned. ‡September 1956. §Shut in.

Pressure Maintenance With Warm-Water Injection

Cardium reservoir, Pembina field, Alberta

By Jack Wahl

Water injection is under way at Pembina in a 160-acre, five-spot pattern. Water is heated to 120° F. so that it will reach injection wells at 90° F. and the formation at 129° F. So far, the program shows that gas-oil ratio will stabilize with 15,000 to 20,000 bbl. injected per well and decreases rapidly after injection reaches 20,000 to 30,000 bbl. per well. Warm water is predicted to recover 5 per cent more oil than cold water.

OF the 250,000 to 275,000 commercially productive acres in Pembina field, approximately 150,000 to 175,000 acres are susceptible to pressure-maintenance operations by means of water injection. The remaining area, of lesser permeability and wider spacing, will lend itself to gas-injection operations.

The ultimate primary oil reserves of the presently developed area are estimated to be 520 million barrels. Additional oil reserves, recoverable from the susceptible areas by means of water injection, are estimated to be 560 million barrels. Total primary and water-flood reserves will be, therefore, in excess of 1 billion barrels of oil.

All basic data and conclusions presented are applicable only to those properties operated by Canadian Seaboard Oil Co. in the southeast sector of the field. These properties are jointly owned by Seaboard, Honolulu, Great Plains Development Co., Canadian Fina, Merrill Petroleums, and Bailey Selburn Oil & Gas.

Field Development

The Cardium reservoir in Pembina field, Alberta, Canada, was discovered in June 1953, by Mobil Oil of Canada. Subsequent development has provided definition of the largest commercially productive oil field on the North American Continent. Total oil-productive area of the field approximates 380,000 acres. However, only 250,000 to 275,000 acres appear to be commercially productive under primary depletion. The limits of this remarkable reservoir are not completely defined to the north nor to the east. Additional drilling will be required in these areas to determine the limits of commercial development.

Pembina field is located in Central Alberta, being some 70 miles southwest of the city of Edmonton. The shape of the existing field development is almost circular, being approximately 30 miles in length and 20 miles in width. Present daily allowable is 77 bbl. per 80-acre-spaced well and the total withdrawal from the field approximates 110,000 bbl. of oil daily. Pembina production represents 25 per cent of the total Alberta daily oil rate. Cumulative oil production to January 1, 1957, was just over 49 million barrels and the total number of wells capable of oil production on that date was 1,680.

In the central reaches of the field, 80-acre spacing is the permitted development pattern. Fringe areas of less permeability are developed on 160-acre spacing.

Reservoir Characteristics

The acreage blocks operated by Canadian Seaboard Oil Co. in the southeast sector of Pembina field are designated as Areas A, B, and C on Fig. 1. They encompass a total of 11,200 acres. Ultimate development on 80-acre spacing includes 140 wells.

Initial production from the Cardium reservoir was established in February 1954 and development was complete in mid-1956. During December 1956 the producing rate averaged 10,625 bbl. of oil per day, at a gas-oil ratio of 783 cu. ft. per bbl. Cumulative oil production from the three areas, to January 1, 1957, approximated 6.2 million barrels.

Geology . . . The Cardium reservoir is Upper Cretaceous in age and is positioned in the Colorado group. Reservoir limits of this immense stratigraphic trap are defined by a permeability and porosity pinchout in all directions.

The average depth of the three Seaboard blocks under investigation is 5,100 ft. subsurface. Structural dip of the reservoir is to the southwest, at a rate of 33 ft. per mile.

The producing interval of the Cardium formation is composed of a conglomerate and sandstone. The conglomerate is erratic in thickness, varying from a few inches to a maximum of 11 ft. in Area A. This interval consists of white to black, pea-sized chert pebbles, with a matrix of sand or shaly sand.

Underlying, and in direct contact with the conglomerate, is the main producing zone of Pembina field—the Cardium sandstone. The Cardium sand is fine to very fine-grained, containing variable amounts of silt or shale, interspersed through the section. Permeability and porosity are directly proportional to the silt or shale content; and, hence, an excellent correlation exists between permeability and porosity.

The sand section often occurs in

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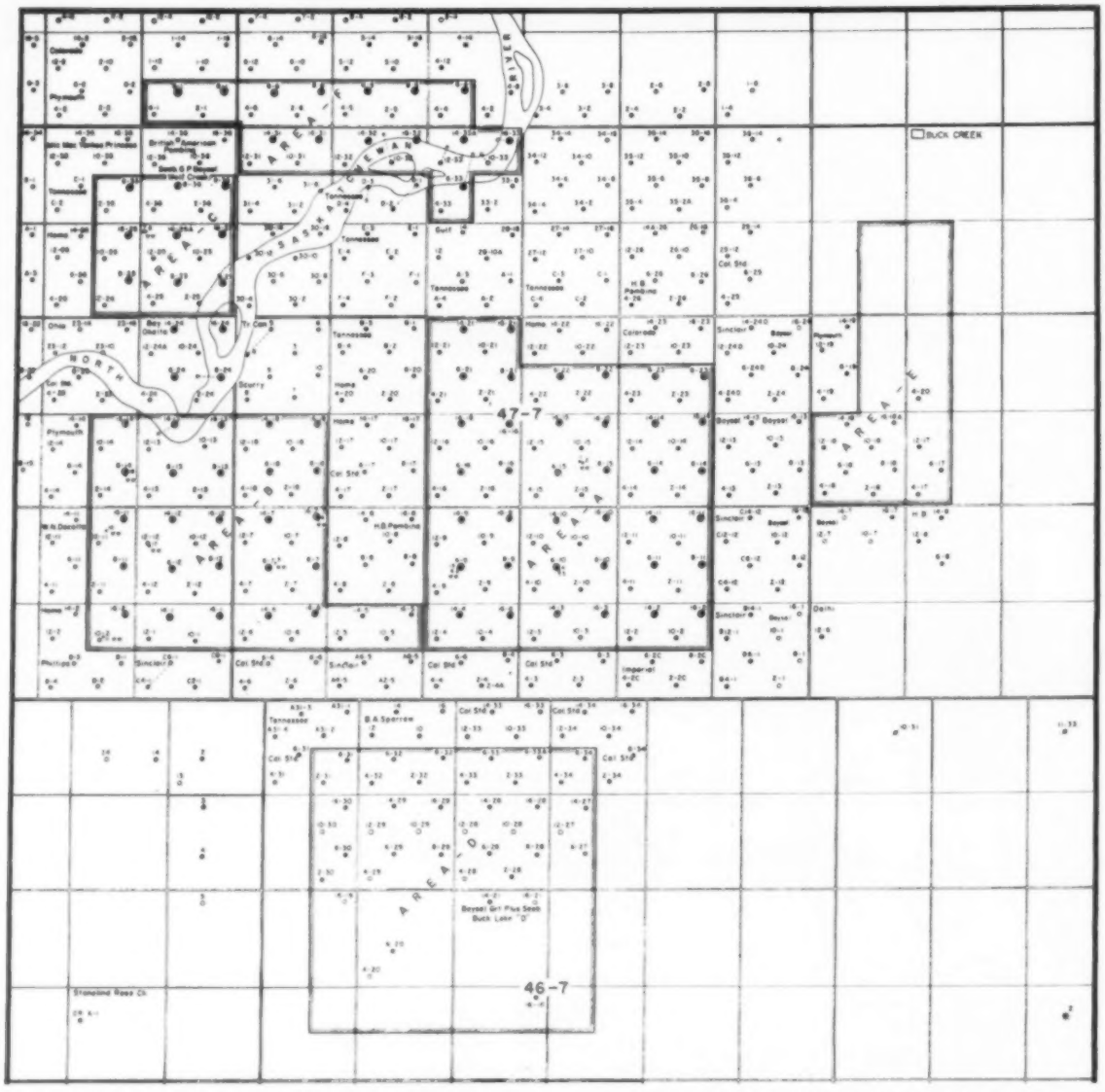


PRESENT DEVELOPMENT of Pembina for water injection are these properties operated by Canadian Seaboard Oil Co. Injection wells are circled. Pattern is 160-acre five-spot. Fig. 1.

two separate lenses and grades into a sandy shale section below.

Core analyses . . . Of the 140 wells drilled in the 3 areas, 83 have been cored. The weighted average porosity and permeability of the 3 areas was found to be 16.7 per cent, and 14.7 md., respectively.

Eight of the wells were cored in oil-base drilling mud, to determine the connate-water content of the three areas. Residual water saturation ranged from 21.8 per cent at 0.26 md. to 5 per cent at 76 md. Thin-section studies indicate the surface area of the pore space is extremely high, which leads to the conclusion that the Cardium reservoir is oil-wet. Other operators have obtained comparable results from oil-base cores in other areas of the field.

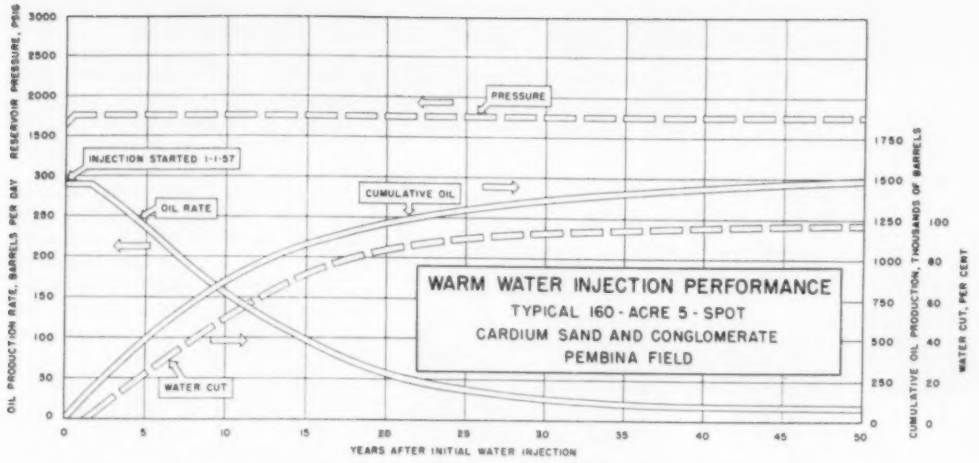
Reservoir fluid . . . Fluid samples taken throughout the field indicate that variable saturation pressures exist in the reservoir. In the Seaboard area of investigation, the producing characteristics and pressure trends conform to the fluid characteristics measured on samples taken from the Buck Creek 10-15 well in Area A, in December 1954.

Saturation pressure (P_s), psig.	1,697.00
Formation volume factor at P_s, bbl. per bbl.	1.258
Gas evolved by differential liberation, cu. ft. per bbl.	478.00
Viscosity at P_s, cp.	1.09
Viscosity at zero pressure, cp.	3.18

Relative permeability . . . Relative-

THE AUTHOR

Jack Wahl is vice president and resident manager of James A. Lewis Engineering, Ltd., in Calgary, Alta. He is a petroleum engineering graduate of the University of Tulsa. Prior to joining James A. Lewis he spent 3 years as petroleum engineer with Atlantic Refining Co. He is presently retained by the Seaboard-Honolulu-Merrill-Great Plains-Bailey Selburn Oil & Gas-Canadian Fina group for installation and supervision of the Pembina water injection system. Paper originally presented at spring meeting of the Rocky Mountain District of A.P.I. Division of Production, Casper, Wyo.



WARM WATER will recover more oil than cold water because injectivity is higher. Fig. 2.

permeability measurements were conducted on 16 samples, from which the following average relationship was obtained:

Total liquid saturation (per cent)	Average relative permeability ratio (K_g/K_o)
97.2	0.001
94.0	0.010
87.0	0.100
77.5	1.00
67.3	10.0
59.0	100.0

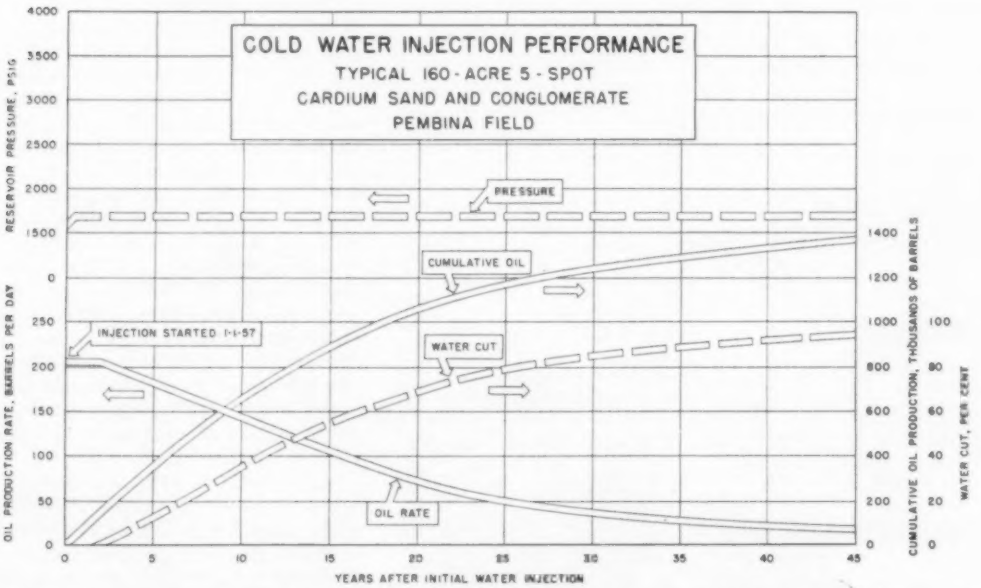
Bottom-hole pressure . . . Original bottom-hole pressure was measured to be 2,665 psig. at a datum plane of 2,100 ft. below sea level. Subsequent withdrawals from the reservoir resulted in a rapid pressure decline, characteristic of an undersaturated crude. The current pressure level of the three areas approximates 1,620 psig.

Productivity index . . . The productivity index of Areas A, B, and C, at original conditions, was calculated to be 0.148, based on weighted-average permeability and associated fluid properties. Actual productivity indices were measured on 31 wells, of which 27 had been mechanically fractured. The average productivity index of the fractured wells was 0.60. Excluding five wells having a productivity index above 1.0 and one low measurement, the mean average productivity index of the remaining 21 wells was 0.47.

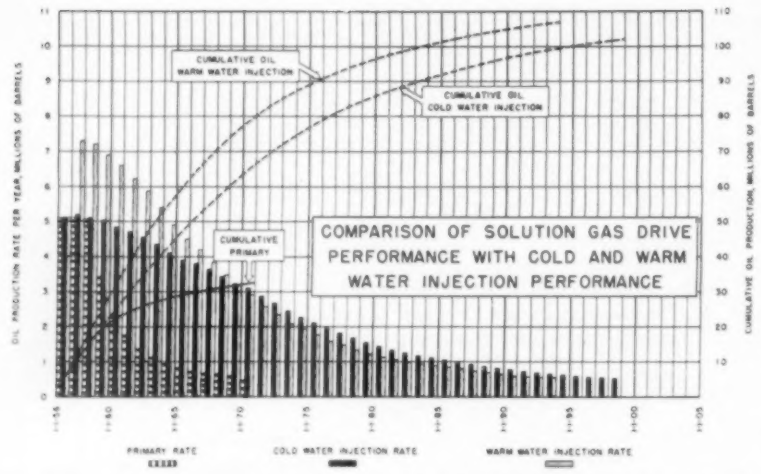
Reservoir content . . . Net productive reservoir volume was determined from core analyses available on 83 wells and from study of electric log, radiation log, or MicroLog surveys in uncored wells. Data applied to calculate the net reservoir volume are itemized following.

Area	Porosity, per cent	Average thickness, ft.	Area, acres	Sand vol., acre-ft.
A	16.7	25.3	5,760	145,780
B	16.3	21.7	4,000	86,800
C	17.7	18.4	1,440	26,490
Avg.	16.7	23.1	11,200	259,070

Using a formation volume factor of 1.247 bbl. per bbl. and an average connate-water value of 7.5 per cent of pore space, the in-place oil for each area is tabulated following:



COLD WATER injection would recover about 7 per cent less oil than warm water during the flood. Ultimate oil would be 5 per cent less. Fig. 3.


CUMULATIVE OIL WARM WATER INJECTION
CUMULATIVE OIL COLD WATER INJECTION
CUMULATIVE PRIMARY
COMPARISON OF SOLUTION GAS DRIVE PERFORMANCE WITH COLD AND WARM WATER INJECTION PERFORMANCE
OIL PRODUCTION RATE PER YEAR, MILLIONS OF BARRELS
CUMULATIVE OIL PRODUCTION, MILLIONS OF BARRELS
PRIMARY RATE
COLD WATER INJECTION RATE
WARM WATER INJECTION RATE

AREA PERFORMANCE predicted shows that water flooding will triple oil recovery. Fig. 4.

Area	Oil-in-place, stock-tank bbl. Bbl. per acre-ft.	Total bbl.
A	958.4	139,720,000
B	938.1	81,427,000
C	1,018.6	26,980,000
Total	957.7	248,127,000

Primary Performance

The aforementioned data have been appropriately combined in equations to predict the solution-gas-drive performance of the Cardium reservoir. These calculations indicate that 13.1 per cent of the original in-place oil can be recovered to the limiting economic oil rate of 8.4 bbl. per well daily. Combined future performance of Areas A, B, and C, after January 1, 1956, is shown on Fig. 4. Ultimate recovery under primary depletion is estimated to be 125.9 bbl. per acre-ft., which is equivalent to 32,624,000 bbl. from the 11,200 acres.

Water-Injection Performance

Several factors indicate that the Cardium reservoir is a prime prospect for successful water flooding. The oil-wet nature of the rock comprising the reservoir results in extremely low connate-water content and proportionally high oil saturation. Laboratory studies, discussed in subsequent paragraphs, show that a large fraction of the oil in place is mobile under the mechanism of water displacement, contrasting to a remarkably low recovery of oil by the solution-gas-drive mechanism. These observations establish the incentive for examination of the reservoir and performance characteristics of the Cardium reservoir under water-injection operations.

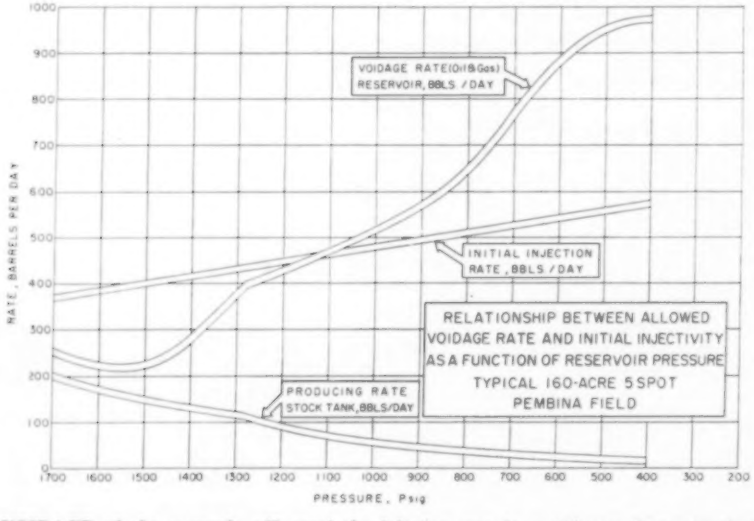
Flood tests . . . The water-flood characteristics of 26 samples from the Cardium reservoir were investigated in the laboratory. In addition, the residual-oil saturation was measured in 1,359 samples from cores taken in water-base drilling mud, which were subjected to flushing by water in the drilling fluid at reservoir conditions. After a combined study of the laboratory data and data obtained from routine core analyses, a residual-oil saturation of 32 per cent of the pore space and a relative permeability to water, at residual-oil saturation, of 40 per cent of the specific permeability to water have been used in the water-flood calculations.

Calculation of injectivity . . . Injectivity calculations were made, applying the weighted average reservoir properties of the three areas under study in the radial-flow formula. Pressure buildup in the system was taken into account and the injection rates applied in calculating performance were based on stabilized conditions after pressure buildup had occurred.

For the better part of the year the temperature of the water supply from the near-surface fresh-water sands is expected to be approximately 35° F. when it reaches the wellhead. Based on heat-transfer calculations, and preliminary measurements during the injection operations, the temperature of the cold water will be approximately 95° F. when it reaches the sand face. The corresponding viscosity of this water at 95° F. is 0.86 cp.

Optimum injection conditions can be achieved with water reaching the sand face at reservoir temperature of 129° F. and a corresponding viscosity of 0.60 cp. It is believed that this can be accomplished by heating the injected water in the plant, to provide water at the injection well at 90° F. Since injectivity is inversely proportional to viscosity, this reduction in water viscosity from 0.86 to 0.60 cp. by heating would accomplish a 43 per cent increase in the initial injection rate. For each degree increase in water temperature, injectivity can be increased by 1.3 per cent. Therefore, two performance predictions are presented in this article. One is based on the utilization of cold water and the other is based on heated water.

Initial injection rates are based on surface-injection pressure of 1,890 psig., providing a sand-face pressure of 4,080 psig. and an initial reservoir pressure of 1,610 psig. The injection rate, using 35° F. water, was calculated to be 265 bbl. per day, decreas-


VOIDAGE RATE(OIL&Gas) RESERVOIR, BBLS./DAY
INITIAL INJECTION RATE, BBLS/DAY
PRODUCING RATE STOCK TANK, BBLS/DAY
RELATIONSHIP BETWEEN ALLOWED VOIDAGE RATE AND INITIAL INJECTIVITY AS A FUNCTION OF RESERVOIR PRESSURE TYPICAL 160-ACRE 5 SPOT PEMBINA FIELD
RATE, BARRELS PER DAY
PRESSURE, Psig

VOIDAGE of the reservoir will equal the injection rate in a 160-acre five-spot when pressure declines to 1,100 psi. The sharp increase in voidage rate is due to high gas-oil ratio. Fig. 5.

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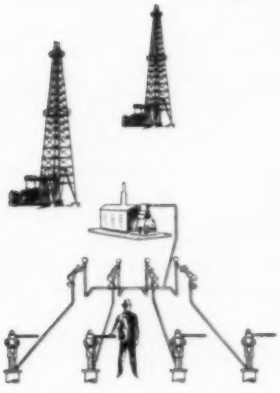

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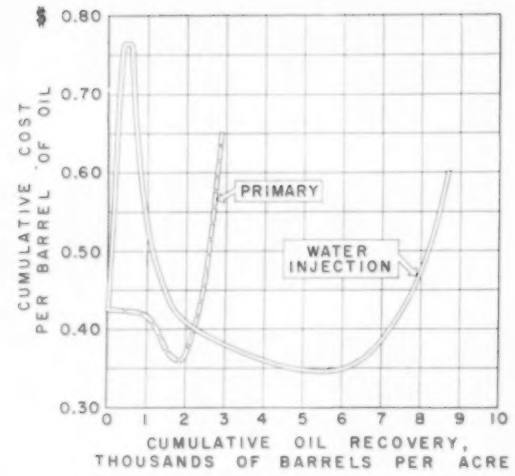
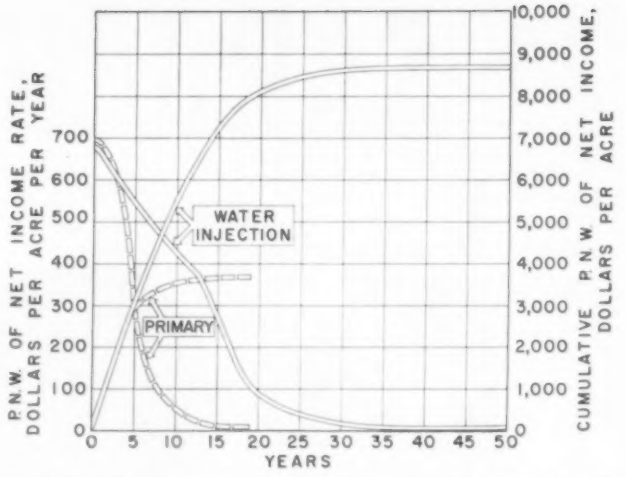


INITIAL COST of water flooding is high because of capital expenses. Fig. 6.



... BUT, per barrel cost of primary production exceeds water-flood costs after only 2,250 bbl. per acre. Fig. 7.

ing to 256 bbl. per day after pressure buildup. Using heated water, the initial injection rate was calculated to be 380 bbl. per day, decreasing to 360 bbl. per day after pressure buildup.

Performance predicted . . . Performance calculations submitted in this article are those resulting from water injection into a 160-acre five-spot. The pressure in each area was estimated at the initial injection of January 1, 1957. The weighted-average pressure used in the calculations was estimated to be 1,610 psig. and the average gas saturation existing in the reservoir at that pressure was estimated to be 1.82 per cent of the pore space. The average 160-acre five-spot contains 3,701 acre-ft., has an average porosity of 16.7 per cent, and an average permeability of 14.7 md.

From the permeability and capacity distribution relationship derived from the core analyses in each area, combined with the appropriate relative permeability and viscosity relationships, the oil recovery from the Cardium reservoir was calculated as a function of water-cut.

The performance of an average five-spot is presented in Fig. 2 for the warm-water injection and in Fig. 3 for the cold-water injection. Total area performance under cold and warm-water injection is compared with the solution-gas-drive performance in Fig. 4.

Results of injection . . . The injection program has not progressed sufficiently to permit a comparative analysis between calculated and actual results. However, certain favorable manifestations of the injection program already are apparent in certain areas of the flood project. The following generalities can be made:

1. Where the injection rate is approximately equal to the voidage rate, a stabilization of the gas-oil ratio is accomplished between 15,000 and 20,000 bbl. cumulative injection.

2. At cumulative injection ranging from 20,000 to 30,000 bbl. per well, the producing gas-oil ratio is decreasing rapidly toward the original solution gas-oil ratio of the area.

Effect of delay . . . Prompt action in starting water-injection operations into the Cardium reservoir is essential to the success of the project. Aside from the benefits normally associated with pressure maintenance, which include a prolonged, favorable producing rate and greater ultimate recovery, much of the low-permeability area in Pembina cannot be effectively water flooded on a 160-acre five-spot injection pattern, if the pressure is permitted to decline below a critical level.

Fig. 5 presents the relationship between reservoir voidage and initial injectivity, for the Seaboard properties, using heated water. The voidage rate is based on a per-well oil rate of 100 bbl. per day, which is equivalent to a five-spot oil rate of 200 bbl. per day. A penalty is applied on all production over a gas-oil ratio of 1,000.

As illustrated by Fig. 5, if the Seaboard properties were permitted to decline to a pressure level of 1,100 psig., voidage would exceed injectivity and a sharp reduction in producing rate would be required to permit a reasonable balance between voidage and injectivity.

Further, pressure transmissibility in the reservoir would be reduced sharply as a result of reduction in liquid permeability associated with increasing gas saturation. This effect, combined with the 160-acre spacing, would permit the main segments of the reservoir surrounding the producing wells to undergo continued solution-gas-drive trend for a substantial time after water injection is initiated.

Reserves . . . Ultimate recovery under a program of pressure maintenance is calculated to be 107,034,000 bbl. of oil injecting warm water and 102,-134,000 bbl. of oil injecting cold water. A comparison of the ultimate recovery by primary depletion and by cold and warm-water injection is shown graphically in Fig. 4 and in the following tabulation:

Ultimate recovery—	Primary depletion	Cold-water injection	Warm-water injection
Total barrels	32,624,000	102,134,000	107,034,000
Barrels per acre-ft.	125.9	394.2	413.1
Per cent of oil in place	13.1	41.2	43.1

Economics

A graphical comparison of the economics of primary depletion and cold-water injection is presented on Figs. 6 and 7.

High per-barrel costs in the early life reflect capital expenditures required to effect either program. Excluded from this analysis is the initial development expense, which amounts to approximately $1,000 per acre. The most significant factor illustrated by this graph is that the cumulative per-barrel cost during primary operations exceeds the cost of water-injection operations, after a cu-

mulative recovery of 2,250 bbl. per acre.

Fig. 7 illustrates the income performance of primary and water-injection operations. Included on this graph is the yearly rate and cumulative value of present net worth of future net income per acre, plotted as a function of time for both depletion programs. Under primary depletion, the cumulative present net worth of net income per acre approximates $3,700 over a 19-year producing life. With pressure maintenance by water injection, the comparable value approaches $8,700.

From these figures capital expenditudes must be deducted, which amount to $150 per acre for primary operations and $250 per acre for water-injection operations. The initial development expense of $1,000 also is excluded from either program. The most important point illustrated by Fig. 7 is that cumulative present net worth of future net income obtained during the 19-year primary depletion history is exceeded by the water-injection program in approximately 7 years.

Design and Installation

The injection system installed on the Seaboard-operated properties consists of a centrally located plant, with a distribution system that permits separate metering of water injected into each injection well. In addition to Areas A, B, and C, Area F—shown in Fig. 1—also is being placed on injection. Six plants serve the 14,080 acres, with the smallest plant serving 960 acres and the largest plant serving 3,360 acres. The same basic design was used in each plant, sized with pumps and associated equipment to fit the area being served.

Water supply is obtained by a system comprised of a 13-ft. vertical shaft, sunk 40 ft. below the surface and some 20 ft. below the water level of the North Saskatchewan River. Slotted pipe is then forced radially from the shaft, through port holes, by means of hydraulic jacks, into gravel beds underlying the river. This installation is expected to yield in excess of 40,000 bbl. of water daily.

To prevent midwinter freezeups, all lines in the distribution system were buried 8 ft. below the surface and all injection wells are enclosed by insulated housing. As an additional precaution against the operational hazard of freezing, the injected water is heated to 120° F. before it leaves the injection plant. All plant facilities are housed in insulated metal buildings.

Negligible cost can be attributed to the water heating, since no market outlet is presently available for gas sale. Even if a market is developed, the volume required for heating is small and the value of the gas is quite low.

Wells to be flowed . . . In areas of high permeability and pressure buildup, the producing wells will be flowed until the water cut restricts productivity below the allowed producing rate. It is anticipated that the entire water-injection project will be converted to pumping status as a result of increasing water cut in the producing wells.

The produced water will be recycled, provided that makeup water and produced water are compatible.

Some of the more important features enclosed in the plant buildings are as follows:

1. Two 1,000-bbl. galvanized tanks. One tank is used for raw-water storage and the other for filtered-water storage. Each tank is equipped with a 4,000,000-B.t.u. direct-fired heater, capable of elevating the water to a temperature of 120° F.

2. Pumps and engines: A horizontal plunger type of triplex pump, capable of delivering 2,000 bbl. of water per day at 360 r.p.m. and 2,300 psi. The pumps are coupled directly to a gas-driven, one-cylinder, 115-hp. engine.

3. Filters: Two 8-ft. pressure filters, using anthrafilt as the filtering media, are included in each plant.

4. Alarm panel: A warning system, utilizing lights and horns to pin point malfunction of each part of the overall plant operation, is incorporated into an alarm panel in each plant office.

5. Centrifugal pumps are utilized to transfer water, which includes filtration, backwashing of filters, and flood of the suction on the pumps.

Injection started . . . Approval for pressure maintenance by water injection was obtained from the Alberta Petroleum and Natural Gas Conservation Board in May 1956 and the project installation was initiated in July 1956. During November 1956, the first well was placed on injection and the entire project, involving 14,080 acres and 176 wells, was completed in February 1957. Alternate rows of 80-acre spaced producers were converted to injection (Fig. 1) resulting in 88 injectors and 88 producers, on a 160-acre five-spot pattern.

Although the winter was generally mild in the Pembina area, much of the physical installation and well conversion was accomplished during subzero temperatures that ranged down to —35° F. Of the wells converted to injection, only three injection lines were frozen during the conversion operation. **End.**

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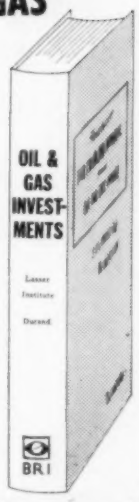

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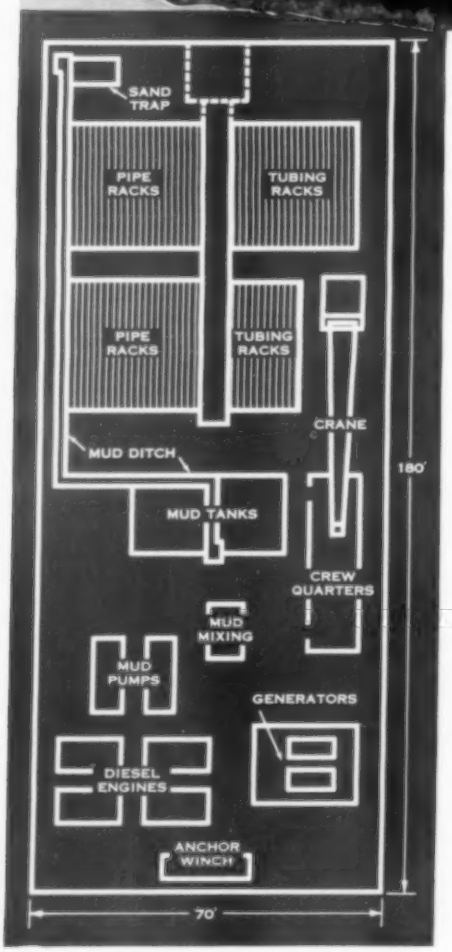

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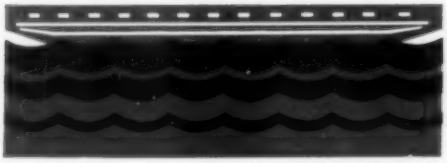

How to Calculate Static Bottom-Hole Pressure . . . in Gas Wells

By Dr. John M. Campbell

THE CALCULATION of static (nonflowing) bottom-hole pressure in a gas well simply involves calculation of the head of gas acting on the bottom of the well. The problem is that gas is compressible, and the density varies with pressure. Consequently, the pressure is not linear with depth, and it is necessary to determine the effect of pressure on density.

The general equation expressing this relationship is:

$$dP = \rho\, dh \qquad (1)$$

where the density ρ is most conveniently expressed by:

$$\rho = MP/ZRT \qquad (2)$$

when substituting Equation 2 into Equation 1 and rearranging:

$$\frac{dP}{P} = \frac{M}{ZRT}\, dh \qquad (3)$$

where:

- G = specific gravity of gas (air = 1.0)
- h = average depth of formation, ft.
- M = molecular weight of gas (28.97G)
- P = pressure, lb. per sq. ft.
- R = 1,544 ft.-lb. per lb.-mole, °R.
- T = temperature, °R. (°F. + 460)
- Z = compressibility factor
- ρ = density, lb. per cu. ft.

In addition to P and h, Equation 3 also contains the variables Z and T. There are three different ways of handling these, in order to integrate Equation 3:

1. Estimate an average temperature and pressure, and find Z for this condition.
2. Estimate an average temperature, and assume that Z varies with pressure at this average temperature.
3. Incorporate changes in temperature and compressibility into the solution.

Method 3 is the most accurate, but is the most tedious, since the solution may not be expressed as a simple mathematical integral. Instead, it is necessary to solve the equation by numerical means, either on a computer or by the application of simple, graphical principles.[5,6]

The first two methods are both relatively simple, although the second is inherently the more accurate of the two, for it does not involve the assumption of an average pressure. They will give generally satisfactory results where the temperature and pressure are not extreme, or where only an approximation is desired. For very deep, high-pressure wells, Method 3 is preferable.

Determination of Average Temperature

The temperature gradient in a well is obtainable from the temperature survey that is often run in a well. Except for anomalies caused by cement, gas sands, etc., the curves obtained by plotting depth on the ordinate versus temperature on the abscissa are usually substantially straight lines, except below 2,000 ft., where there is some curvature toward the ordinate. Where such a survey is available, the best average temperature is obtained by finding the area bounded by the ordinate, the curve, and the depth value, and dividing it by the well depth. Where the curvature at lower depths is not pronounced, an arithmetic average of the wellhead and formation temperature may be used.

In the absence of a temperature survey the bottom-hole temperature from an electric log may be used together with an estimated wellhead temperature. For a formation uphole, a straight line may be drawn between these two points to find an approximate formation temperature. When neither of these is available, one must resort to data on offset wells or regional characteristics.

Use of first method . . . When using the assumptions of this method, Equation 3 may be integrated from P_1, 0 to P_2, h to yield:

$$\ln \frac{P_2}{P_1} = \frac{M\,h}{Z_a\,R\,T_a} \qquad (4)$$

where:

- Z_a = compressibility factor at P_a and T_a
- P_a = average pressure
- T_a = average temperature, °R.

The compressibility factor in this and all subsequent calculations would be determined in the manner shown in Part 34.

This, in reality, is a trial-and-error solution for it is necessary to know the bottom-hole pressure before an average Z_a may be found. Consequently the best procedure is to:

1. Assume a bottom-hole pressure. (As a first assumption it may be calculated from Equation 4 using Z_a = 1.0.)
2. Calculate an arithmetic average pressure. [$P_a = (P_1 + P_2)/2$] and an arithmetic average temperature.
3. Solve both the right and left side of Equation 4.
4. If they are not equal, assume a new value of P_2 and report Steps 1-3 until an equality is obtained.

A convenient set of graphs is available in the literature to aid in the above solution.[1]

Use of second method . . . As pointed out above, Equation 3 might be solved by finding an average well temperature and considering only the change in compressibility with pressure. If this temperature is incorporated, the equation may be written as:

$$\frac{Z\,dP}{P} = \frac{M}{R\,T_a}\, dh \qquad (5)$$

This may be integrated mathematically to yield:

$$\int_{P_1}^{P_2} \frac{Z}{P}\, dP = \frac{hM}{RTa} \qquad (6)$$

where:

- P = pressure, lb. per sq. ft.
- T_a = average temperature, °R.

Author is chairman, school of petroleum engineering, University of Oklahoma, Norman.

M = gas molecular weight
R = 1,544 ft.-lb. per lb.-mole, °R.
h = formation depth, ft.
Z = compressibility factor at T_a and P

The integral on the left-hand side of Equation 6 may be integrated graphically by plotting Z/P versus P and setting P_1 equal to the wellhead shut-in pressure. The desired value of P_2, the formation pressure, could then be found by trial and error when the area under the curve, between P_1 and P_2, was equal to the right-hand side of Equation 2.

A more convenient solution has been proposed by Fowler[2] which makes use of reduced pressure P_r and reduced temperature T_r (see Part 33).

$$P_r = P/P_c$$

$$dP = P_c\, d\,P_r \qquad (7)$$

Substituting Equation 7 into Equation 6 then yields:

$$\int_{P_{r1}}^{P_{r2}} \frac{Z\,dP_r}{P_r} = \frac{h\,M}{RT_a} \qquad (8)$$

The left-hand integral was integrated from $P_{r1} = 0.2$ to $P_{r2} = 12$ for values of T_r between 1.0 and 2.5. The lower limit of 0.2 was arbitrary, for any value could have been chosen. It is convenient, however, to use some positive number rather than zero for P_{r1}.

Plots of $\int (Z\,d\,P_r)/P_r$ vs. P_r with T_r as a parameter have been prepared[2,7] which simplify the solution of Equation 8. However, in order to simplify the procedure and eliminate errors in reading the graphs, Table 1 has been prepared. It is then only necessary to read the value of the integral at the given conditions. Where necessary, simple arithmetic interpolation between the values shown is satisfactory.

Table 1 makes use of the fact that the left-hand side of Equation 8 may be written:

$$\int_{P_{r1}}^{P_{r2}} \frac{Z\,dP_r}{P_r} = \int_{0.2}^{P_{r2}} \frac{Z\,dP_r}{P_r} - \int_{0.2}^{P_{r1}} \frac{Z\,dP_r}{P_r} \qquad (9)$$

The following general procedure may then be outlined:

1. Calculate T_a.
2. Solve the right side of Equation 6.
3. Solve for P_{r1} (from the wellhead pressure).
4. Find integral from 0.2 to P_{r1} using Table 1.
5. From Equation 9, determine the integral from 0.2 to P_{r2}.
6. From Table 1, find the value P_{r2} corresponding to this integral.
7. Find P_2, the value desired from $P_2 = P_c\,P_{r2}$.

Example problem . . . A well is producing 0.74 - specific - gravity natural gas from a formation at 5,800 ft. After being closed in for 24 hours the wellhead pressure was 1,800 psig. The formation temperature was known to be 128° F., and the wellhead temperature was 68° F.

Solution:

From Part 34: $P_c = 665$ psia. and $T_c = 385°$ F.

$$M = (0.74)\,(28.97) = \mathbf{21.5}$$

$$T_a = \frac{68 + 128}{2} = 98° \text{ F.}$$

$$\frac{h\,M}{R\,T_a} = \frac{(5{,}800)\,(21.5)}{(1{,}544)\,(98 + 460)} = \mathbf{0.145}$$

From Table 1:

$$\int_{0.2}^{P_{r1}} \frac{Z\,dP_r}{P_r} = 2.29$$

From Equation 8:

$$\int_{0.2}^{P_{r2}} \frac{Z\,dP_r}{P_r} = 2.29 + 0.145 = 2.435$$

From Table 1:

$$P_{r2} = 3.37$$

or $P_2 = (665)\,(3.37) = \mathbf{2{,}240}$ **psia.**

Use of third method . . . The third general method of calculating bottom-hole pressure allows the compressibility to vary with both pressure and temperature.[6] The final equation is derived from the general flow equation and takes the form:

$$\frac{Gh}{53.3} = \int_{P_w}^{P_f} \frac{ZT}{P}\,dP \qquad (10)$$

where:
P = psia.
P_w = wellhead pressure, psia.
P_f = formation pressure, psia.

By numerical means, this equation may be solved by the expression:[6]

$$0.0375\,Gh = (P_1 - P_0)\,(I_1 + I_0) + (P_2 - P_1)\,(I_2 + I_1) + \ldots\ldots + (P_n - P_{n-1})\,(I_n + I_{n-1}) \qquad (11)$$

where:
I = TZ/P

TABLE 1—INTEGRAL OF $(Z/P_r)\,dP_r$, FROM 0.2 TO P_r, VERSUS P_r

Pseudoreduced pressure, P_r	Pseudoreduced temperature, T_r										
	1.05	1.10	1.20	1.30	1.40	1.50	1.6	1.8	2.0	2.4	3.0
0.2	0	0	0	0	0	0	0	0	0	0	0
0.4	0.62	0.62	0.63	0.63	0.63	0.64	0.64	0.64	0.64	0.64	0.64
0.6	0.96	0.97	1.00	1.02	1.04	1.05	1.05	1.05	1.05	1.05	1.05
0.8	1.18	1.21	1.26	1.30	1.32	1.34	1.35	1.36	1.36	1.36	1.36
1.0	1.33	1.38	1.46	1.50	1.53	1.55	1.57	1.59	1.60	1.61	1.61
1.2	1.43	1.50	1.60	1.65	1.68	1.71	1.74	1.76	1.78	1.80	1.81
1.4	1.49	1.59	1.71	1.77	1.81	1.85	1.88	1.91	1.94	1.95	1.98
1.6	1.53	1.65	1.80	1.88	1.92	1.96	1.99	2.04	2.06	2.08	2.11
1.8	1.56	1.69	1.87	1.96	2.01	2.06	2.09	2.14	2.17	2.20	2.23
2.0	1.59	1.73	1.92	2.03	2.09	2.14	2.18	2.23	2.27	2.30	2.33
2.5	1.66	1.82	2.04	2.18	2.26	2.32	2.36	2.44	2.48	2.51	2.56
3.0	1.73	1.89	2.14	2.29	2.40	2.47	2.51	2.60	2.64	2.69	2.74
3.5	1.80	1.96	2.23	2.39	2.52	2.58	2.64	2.74	2.79	2.85	2.90
4.0	1.86	2.03	2.31	2.47	2.62	2.69	2.75	2.86	2.92	2.98	3.04
4.5	1.93	2.10	2.38	2.56	2.70	2.78	2.85	2.97	3.03	3.10	3.16
5.0	2.00	2.17	2.45	2.63	2.78	2.86	2.94	3.07	3.13	3.21	3.27
5.5	2.07	2.24	2.52	2.70	2.86	2.94	3.02	3.15	3.22	3.30	3.37
6.0	2.13	2.30	2.59	2.77	2.93	3.02	3.10	3.24	3.30	3.39	3.46
7.0	2.26	2.43	2.71	2.90	3.06	3.15	3.24	3.39	3.46	3.56	3.62
8.0	2.39	2.56	2.84	3.03	3.18	3.29	3.37	3.52	3.60	3.70	3.77
9.0	2.51	2.68	2.96	3.15	3.31	3.41	3.49	3.64	3.73	3.82	3.90
10.0	2.63	2.80	3.08	3.26	3.42	3.52	3.61	3.76	3.84	3.94	4.02

Subscripts denote pressures, et al., at increments between the wellhead (P_o) and formation pressure (P_n).

Inasmuch as the left-hand side of Equation 11 may be easily determined, the process consists of choosing appropriate values of depth between the surface and the formation. If the temperature gradient is known, values of pressure and compressibility must be chosen so that the equality in Equation 11 is satisfied. This, therefore, is a trial-and-error solution.

On an internally programed digital computer the above solution is relatively easy. Even with manual calculations it may be made less tedious by the application of the Simpson and trapezoidal rules[5,6] using only two increments.

Although this latter method is excellent, it is doubtful that it may be justified over Method 2, in the absence of a computer, unless a very deep well with a high temperature gradient is involved.

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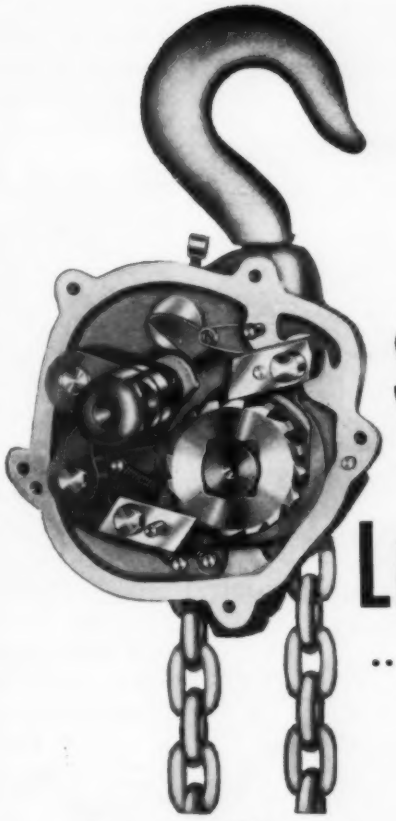

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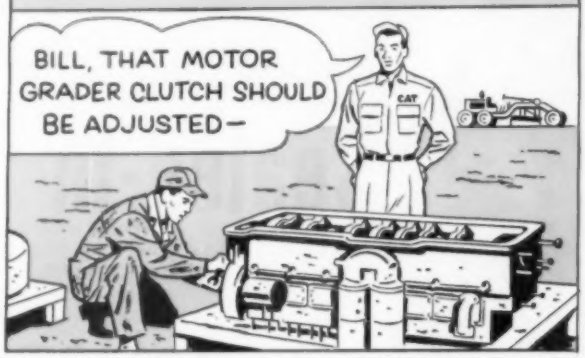

I KNOW, BUT I'M MUCH TOO BUSY! OURS IS A BIG OPERATION, YOU KNOW.
CAN WE HELP? WE COULD HANDLE YOUR MAJOR RECONDITIONING JOBS, THEN YOU'LL HAVE MORE TIME FOR MAINTENANCE. WHY NOT TALK TO THE BOSS?
CAT

—AND WE HAVE SPECIALIZED REPAIR BAYS WHERE WE CAN REALLY DO A COMPLETE JOB! DO IT QUICK, TOO.
LET'S GIVE IT A TRY. WE'LL SEND OUR BIG REPAIRS IN TO YOU CHAPS!
CAT

SOME DAYS LATER
THERE! THIS ONE'S READY TO ROLL AGAIN. WE'RE CERTAINLY KEEPING AHEAD OF MAINTENANCE AROUND HERE THESE DAYS!
LET'S CHECK ON MACHINE NO. 17. THE OPERATOR REPORTED A LEAKY PUMP—

SOME WEEKS LATER
AND, MY MAINTENANCE PROGRAM IS DEFINITELY WORKING SINCE YOU TOOK OVER THE TIME-CONSUMING REPAIR WORK... WE ALSO HAVE FEWER MAJOR REPAIRS NOW.
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By Robert L. McIntire
The Datics Corp.

Using Electronic Computers in the Oil Industry — Part 17

Calculating Tank Tables From Strapping Data

THE calculation of tank tables from strapping data is a recurring problem in the petroleum industry. For each tank, a table showing the volume of liquid as a function of the depth of liquid must be prepared. For vertical tanks, no particular problem exists since the change in volume with a change in height is a constant. Horizontal cylindrical tanks, however, offer a more serious challenge to a computer.

Starting with strapping data . . . Each tank must be measured in the field previous to the calculations to determine the dimensions. These data consist of the following:

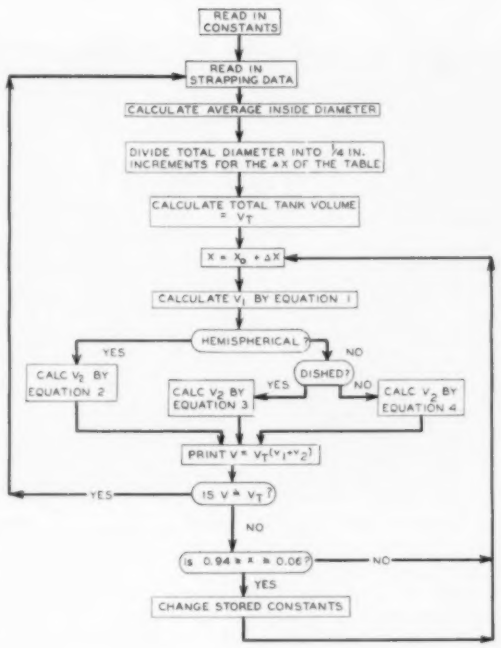
1. Head thickness
2. Shell thickness
3. Shell circumference
4. Shell length.

Several measurements may be taken and the computer will use an average in making the final computations.

The best method of using these data, known to this author, requires a calculation using an empirical curve relating the per cent of depth to the per cent of the total volume. Separate equations must be used for the liquid volume in the tank shell and the liquid volume in the tank head. In addition, each different type of head requires a different type of equation. Nevertheless, the computer has a sufficiently large memory to handle this type of problem.

Errors are small . . . Naturally, when using an empirical equation to represent any function, errors will exist. In order to keep these errors less than, for example, 0.0005 per cent of the total volume, different equation constants must be used. One set of constants will apply to the very bottom and the very top part of the tank. A second set of constants will be used in calculating the central section of the tank.

Some example equations are shown with constants for the lower 6 per cent of depth in a horizontal cylindrical tank. These constants differ during the calculation of the central section.



BLOCK diagram shows how the machine can be used to print out tables in ¼-in. increments. Fig. 1.

The block diagram in Fig. 1 illustrates the means by which the machine can be used to print out tables in ¼-in. increments. This procedure could be modified to be useful to the accounting departments when they need to calculate liquid volumes from tank depth measurements. Using these equations, the total internal machine storage required is considerably reduced.

Equation for shell:

$$v_1 = AX + BX^2 + CX^3 + DX^4 + EX^5 + FX^6 \quad (1)$$

Equation for hemispherical head:

$$v_2 = GX^2 + HX^3 \quad (2)$$

Equation for shallow dished head:

$$v_2 = IX + JX^2 + KX^3 + LX^4 \quad (3)$$

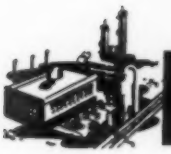
Equation for conical head:

$$v_2 = MX + NX^2 + OX^3 + PX^4 + QX^5 + RX^6 \quad (4)$$

Where (for the first 6 per cent of the total volume):

A = 0.6697583
B = 12.687614
C = 297.67917
D = 5,765.5556
E = —62,791.667
F = 283,055.56
G = 3.0
H = —2.0
I = 0.00083333
J = 0.5083333
K = 18.33333
L = —83.3333
M = —0.030333
N = 6.6602778
O = —457.29167
P = 15,756,944
Q = —243,750
R = 1,402,777.8

Part 1
Laboratory Testing



THE FOREMAN'S PAGE
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JOB IMPROVEMENT FOR THE PROCESS FOREMAN—100

Laboratory Testing Controls Product Quality

TYPICAL LABORATORY used for control of operating, finishing, or blending operations.

ALL operating units, finishing units, or blending operations are controlled on the basis of laboratory tests of one or more types. If units are operated efficiently and economically, it is necessary to understand laboratory-testing procedures. Quality of product must be acceptable to customers and it is necessary to manufacture them economically.

Strict and rigid product specifications have been established to insure this quality is maintained.

What is a specification? . . . A specification is a set of measurements or rules which define and describe a substance — petroleum product or feed stock.

Product quality standards . . . Naphthas, oils, and gases are examined by physical and chemical tests. Laboratory procedures for testing oils and gases now have been developed to an accuracy that makes most test results dependable. Through the use of these tests a product can be examined and compared with a standard material or a set of test values known as specifications which represent standard material.

Material taken from process-training-program manual, Baton Rouge, La., refinery of Esso-Standard Oil Co.

The purpose of laboratory testing is to identify and classify oil or gas under inspection. The lab results from a sample serve directly to compare with product specifications and to give the necessary information to guide and control operations.

Specifications state the tests required and the allowable limits of each test for a particular product. The consistent quality established by this practice assures the customer of a satisfactory product and enables the manufacturer to uphold a reputation for good product quality and performance. Salesmen quote specifications in sales contracts to protect the customer and manufacturer. Therefore products must be made on test. Certain desirable qualities are sought by customers—for example, high octane number. But these qualities often are expensive to the manufacturer and to prevent giving away extra quality, specifications must be met exactly.

Product control in operations . . . Complete laboratory tests are made on finished products but on routine unit streams only those tests that give quick information on vital points of operation are made. This practice reduces the laboratory work load and speeds up the return of tests. This reduces the time an offtest stream might flow into a product tank or the time an ontest stream might be wasted.

Control tests are necessary to unit operations. These lab results inform the operator that the stream is ontest or offtest. If offtest, they indicate about how far off and if the stream is too heavy or too light. By reviewing the lab tests on all streams we can determine if operating troubles are localized or if they are general. Then we can decide whether the feed, temperature, pressure, reflux, or something else requires adjustment.

Lab tests also are very helpful in locating mechanical troubles. Offtest products can result from mechanical failures in controlling instruments or leaks in heat exchangers or valves.

By W. L. Nelson
Technical Editor

Platinum Reforming Yields at High Octane Number

At one time you published catalytic reforming yields. Now that the process is more complete, can you give us more up-to-date information? S.W.T.

There are so many variables in catalytic reforming, particularly the kind of feed stock and the kind of platinum catalyst or process used, that approximations must still suffice. However, more data are now available and accordingly more dependable information can be presented.

Fig. 1 shows approximate average yields in platinum-catalyst reforming as a function of the octane number of the product and the type of charge stock. Feed stocks are classified primarily by characterization factor but if conventional boiling ranges of feed are considered, octane number is also a fairly good property for classifying charge stocks. The yields shown in Fig. 1 are generally higher than those published heretofore (OGJ, Jan. 3, 1955, p. 117). Note that higher yields are obtained with fresh or regenerated catalyst whereas yields tend to be lower for processes in which the catalyst is used for a long period. Clear indication of the superiority of one process over another is not evident except with regard to the condition in which the catalyst is maintained. High sulfur (0.05-0.2 per cent) tends to reduce the octane number of the reformate (1 to 3 units) especially as the catalyst becomes old (Meerbott et al., Naphtha Processing Over Platforming Catalyst, Ind. Eng. Chem., 49, 655, April 1957).

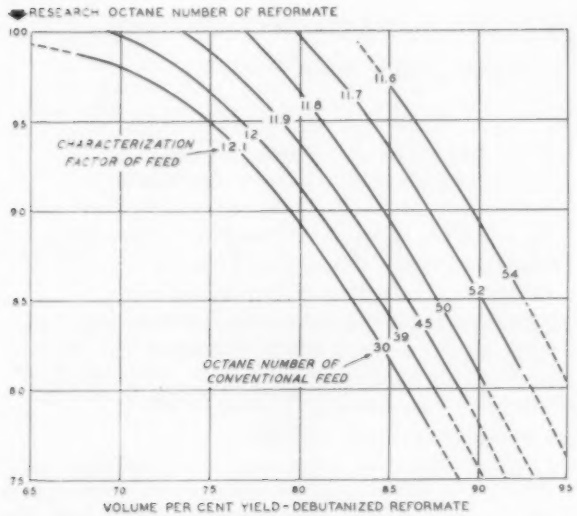
Likewise all of the processes appear to produce about the same amount of propane (see Fig. 2) but the amount of butanes produced is affected somewhat by the process employed. The Sinclair-Baker and Powerforming processes appear to produce the smallest amount of butanes, whereas the Atlantic process produces the largest amount of butanes (or smallest amount of other gases). Other processes produce intermediate amounts of butanes with Platforming falling somewhat high in the range, and Ultraforming somewhat low. Inasmuch as the yields of debutanized reformate and of propane are much the same for all processes, this means that butanes are obtained in place of fixed gases in the Atlantic and to some extent, Platforming processes.

The data of Figs. 1 and 2 here are only slightly different from older data published on this page except that the data are now extended to higher octane numbers and to lower reformate yields.

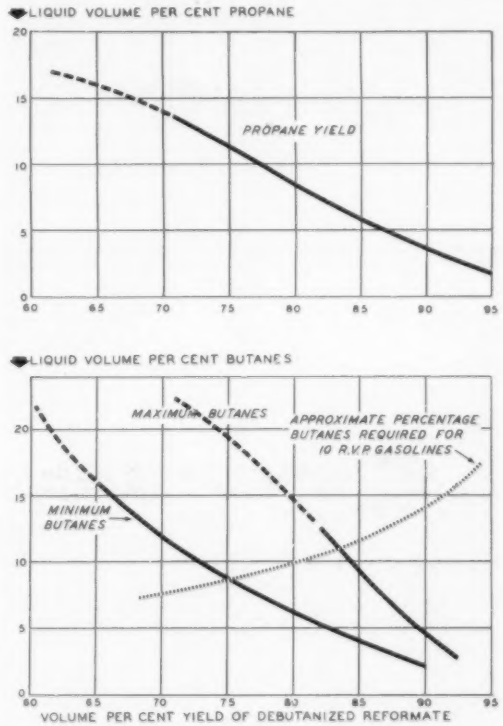
The amount of iso compounds formed is not clear. However, meager data on Platforming seem to indicate a volume ratio of isobutane to butane ranging from 0.57 to 0.95 whereas for Catforming the ratio is about 1.07. The ratio for isopentane to pentane is just the opposite, being 1.23-2.86 for Platforming but only about 0.63 for Catforming.

Note that liquid volume per cent yields of reformate, butanes, and propane exceeding 100 per cent are possible. The curves indicate approximately the following:

	Per cent recovery
90 per cent reformate	97
80 per cent reformate	94-103
70 per cent reformate	93-109

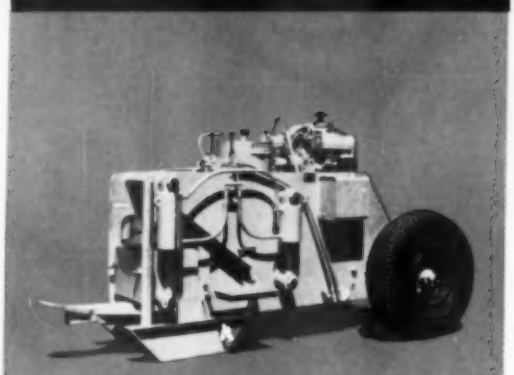


APPROXIMATE platinum-catalyst reformate yields as a function of type of charge stock. Fig. 1.



APPROXIMATE propane and butanes yields in platinum-catalyst reforming. Fig. 2.

CINCH



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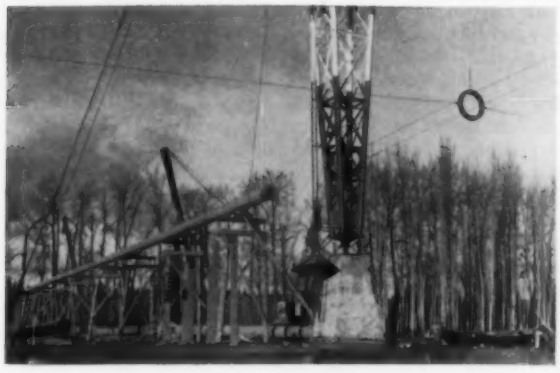
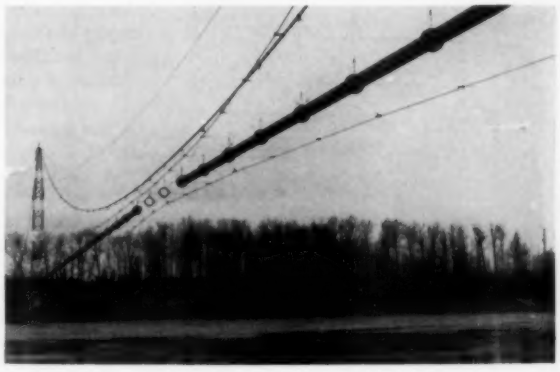
Crose offers two additional Cinch models for bending pipe 16"-30" and 22"-36" in diameter.





Westcoast's 30-in. pipe goes through the slot and over the water as . . .

Canadian gas line leaps five rivers

WHEN melting snow and spring rains transform British Columbia rivers into raging torrents, submarine pipelines are in for bad trouble. The rivers often scour their beds to depths which would endanger an underwater crossing.

Westcoast Transmission Co., Ltd., chose to go over the streams instead of under at five of the eight major crossings on its 650-mile, 30-in. gas line from Peace River to the United States border at Sumas, Wash. Back of the decision were investigations into river channels, currents, river-bottom structures, and scouring at the locations to be crossed. There were studies of soil and rock formations on shore. Research was conducted into rainfall and snowfall records. Wind velocities also were considered.

When all of these factors were weighed, the decision was made to span rivers with suspension bridges. This type of crossing has proved the best answer under certain conditions to the problem of building a crossing that is as reliable as the rest of the pipeline. It is also the most spectacular phase of pipeline construction.

The rivers crossed, length of each bridge, height of pipe above the high-water line, spacing of steel-pipe saddles on center, and number of saddles are listed in the table.

The Peace River bridge carries two 26-in. gas lines and two 4-in. liquid-hydrocarbon lines. The other crossings carry the single 30-in. main gas line. Pipe with wall thickness of 0.500-in. was used on all crossings but Fraser No. 2, which was 0.375-in. The reduction in wall thickness at Fraser was possible because of a pressure-regulator station upstream at Hope. B. C. Pipe is A.P.I. 5LX-52, silicon-killed, aluminum treated, with the longitudinal weld 100 per cent X-rayed.

WESTCOAST RIVER CROSSINGS

River—	Length (ft.)	Height (ft.)	Spacing (ft.)	No. saddles
Peace	1,675	58	25	67
Fraser No. 1 (at Shelley)	1,290	28	30	42
Fraser No. 2 (at Flood)	1,470	70	30	55
Quesnel	480	21	30	15
Thompson	650	19	30	20

Construction . . . The first step in construction is to excavate for tower foundations. Concrete is then poured for the foundations and towers are erected. The network of cables is strung across the river and steel rings are placed in position.

Pipe is buried in the ground to within a short distance of the towers. It rises at an angle to go through the first ring, which is fabricated into the tower itself. The final tiein weld is made in the center of the bridge. Thus the load on the bridge is balanced evenly at all times.

The towers are located well away from the river bank safely beyond the expected scour of the river. They carry only the main cables. Wind cables are guyed to separate towers spaced to provide a sag for the most economical design under the wind-bracing system.

Two-footed towers are in more common use in the United States. The main tower also supports the wind cables by the use of wind arms extending from either side. This design requires a much heavier steel tower. But it is popular because it requires less space. Where space is available, the design is more economical.

Which prime mover should be used for your station—engine or electric?

By C. F. Leslie

COMPETITION in the petroleum industry requires very close scrutiny of proposed investments and their alternatives. Choosing a prime mover for pipeline stations is no exception.

Sometimes conditions exists which leave no choice. Either we should use electric power or in other cases engine power. One such case is that of the remote controlled or automatic unit. However, even here the relative-

Author is with Phillips Petroleum Co. Paper presented at Petroleum Electric Power Association, Amarillo, Tex., June 3-5, 1957.

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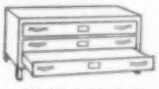

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PIPELINE PATROL

ly safe position of the electric motor is being challenged by the unattended engine installation.[1] So far, the installation of unattended engines seems to be confined to large gas pipelines.

It has been Phillips Petroleum Co.'s practice to conduct an economic study before deciding which type of prime mover to use in each case. In light of manpower costs we have not had too much difficulty in justifying electric units for our new locations. These, for the most part, in the last few years have been remote controlled.

Which Prime Mover to Use?

Which mover should be used when installing additional capacity in existing line at an existing station? Here manpower will not be a consideration because engines are already operating which call for around-the-clock staffing of the station; 1,250 hp. will be required, calling for investments as shown in Table 1. A building would be required for the engine, but not for the motor.

TABLE 1—INVESTMENT REQUIRED TO ADD 1,250 HP.

Driver installed	$80,000	$28,600
Engine accessories and piping installed	27,500	.....
Gear installed	12,500	.....
Pump installed	10,200	10,300
Unit foundation	6,000	1,800
Building extension	20,500	.....
Relocate existing equipment and lines	1,000	4,500
Starter installed	.....	6,000
Heat exchanger	6,100	.....
Motor ventilator	.....	1,200
Piping material and labor	21,000	21,000
Controls material and labor	.....	13,200
Misc., elec. material and labor	4,000	6,500
Fuel tanks	7,700	.....
Paint	500	800
Contingencies	16,000	9,600
Total	$213,000	$103,500

Table 2 shows one method of making an economic study. The various factors have been tabulated using 100 and 75 per cent capacity factor for the unit. You will note also that the average power rate (1.09 cents/kw.-hr. for 75 per cent load factor and 0.99 cent/kw.-hr. for 100 per cent load factor) is high. However, that is offset by the 27-cent gas.

This study assumes a life of 20 years for the project. Certainly with correct maintenance the equipment should last that long. However, it is too idealistic to hope that a project will stay put for 20 years. A comparison was made using shorter periods. The results are shown in Table 3.

Salvage value used for the 5 and 10-year cases is the value after depreciation. Depreciation was figured by the declining-balance method.

The $109,500 (difference) which we would invest in the engine would give us between 21 and 25 per cent rate of return on our money (100 per cent capacity). Also, a better payout, so far as the motor is concerned, for the 75 per cent capacity case. This bears out statements made by W. H. Stueve in his paper, "Buy Power or Make Your Own?" which was presented during the 1956 Petroleum Conference of the A.I.E.E.[2]

Justifying Electric Drives

Since all of our product lines handle a variety of products, it is not possible for them to maintain 100 per cent capacity factors. Actually even the 75 per cent capacity figures show very little justification for the electric motor. By comparison an average rate of 0.8 cent/kw.-hr. (100 per cent load factor) would have extended the payout to 5.4 years and an average rate of 0.88 cent/kw.-hr. (75 per cent load factor) would have extended

TABLE 2—TOTAL COST AFTER 20-YEAR LIFE

	100% capacity		75% capacity	
	Engine	Motor	Engine	Motor
Initial investment	$213,000	$103,500	$213,000	$103,500
Operating expense:				
Ad valorem taxes	42,600	20,700	42,600	20,700
Operating and maintenance, labor and supplies	312,400	16,000	289,600	16,000
Power:				
Gas, 27 cents/M.c.f.	372,600	.....	300,400	.....
Elec., 0.99-1.09 cents/kw.-hr.	.....	1,672,000	.....	1,394,000
Total operating expense (20-year)	$736,600	$1,708,700	$632,600	$1,430,700
Total cost before tax saving	$949,600	$1,812,200	$845,600	$1,534,200
Less 50 per cent rate income tax saving	474,800	906,100	422,800	767,100
Net savings engine vs. motor	$431,300	.....	$344,300	.....
Annual rate of return on additional inv. for engine, per cent)	25	.....	21	.....
Years to pay out	3.97	.....	4.71	.....

Pipeline Patrol

TABLE 3—ANNUAL RATE OF RETURN ON ADDITIONAL INVESTMENT REQUIRED FOR ENGINE

Period—	Per cent — 100% capacity	75% capacity
5 years	21	17
10 years	24	20
20 years	25	21

the payout to 6.5 years. However, when such a study as this is presented to management, electric drives can sometimes be recommended because of the following circumstances:

- Reduce downtime from major overhauls. (This factor is sometimes challenged if it cannot be proved that the power source is reliable.)
- A better position can be maintained insofar as future manpower is concerned.
- The motor will provide a step toward possible full electrification and remote control with a corresponding reduction of manpower.

In summary, we feel that the battle to justify electric drives will continue. To justify electric power we offer the following suggestions:

. . . Pipeline pumping rates. Some power companies still do not have rates which recognize these unusually high load-factor loads.

. . . Annual minimums. Since there seems to be some seasonal fluctuations in the pipeline deliveries, an annual minimum would be a better way of guaranteeing the power company a return on its investment. This is not a request for charity, but a plea for an honest appraisal of this approach to see if it is feasible.

. . . Across-the-line starting. A real engineering study should be made before the ultimatum to go reduced voltage is delivered. We must admit, however, that we are guilty of not providing time for such a study before we must have an answer. Experience has shown that systems which cannot stand across-the-line starting are often in trouble even with reduced voltage.

. . . Close cooperation. From the engineer's viewpoint, we cannot work too closely with power companies. From the minute the decision is made to "go electric," a constant two-way flow of information is necessary.

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1. Corkill, D. P., "Two and One-half Years of Gas-Transmission Automation," The Oil and Gas Journal, May 21, 1956, p. 153.
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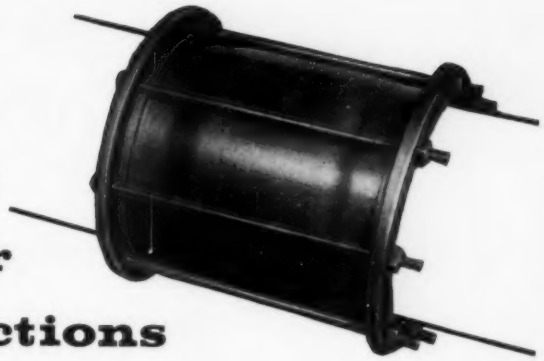

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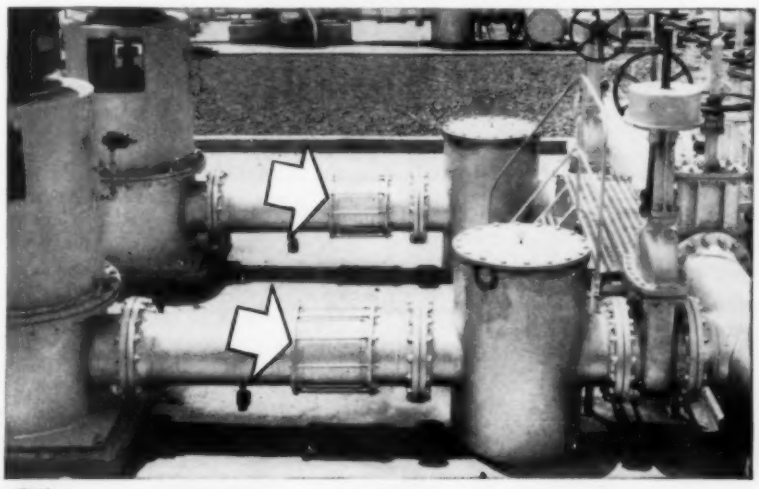

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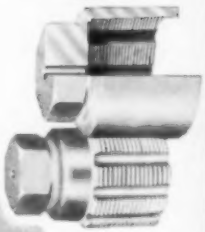

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Among the Drilling Contractors

Union to Get Barge Unit For Offshore Operations

Union Producing Co., operating subsidiary of United Gas Corp., Shreveport, is getting ready to do some offshore drilling of its own. All its offshore work so far has been with contract rigs.

It will use a self-stabilizing, submersible drilling barge designed by Friede & Goldman, Inc., naval architects and marine engineers, of New Orleans. Contract for its building has been awarded Todd Shipyards Corp., of Houston.

The barge unit will be capable of drilling in open water 76 ft. deep, and to depths of 20,000 ft. It will be similar in general characteristics to others already in operation, or being built for various others.

It will consist essentially of a slotted hull with an elevated drilling deck, supported by fixed columns. Over-all length will be 190 ft., beam 160 ft., and depth 13 ft. Its slot will be 36 ft. long and 32 ft. wide. Diesel-electric power will be used for drilling. A 143-ft. 1,000,000-lb load-capacity, cantilever derrick will be provided.

Union now has two active offshore operations, both in the Gulf of Mexico. One is in Block 53, Eugene Island area, off St. Mary Parish, and the other in Block 101, Vermilion area, off Vermilion Parish. Rigs of Offshore Co., Baton Rouge, are being used on both.

Gilmour Drilling Co., Alice, Tex., is drilling for Climax Corp., of Austin, Tex., at a wildcat location 2 miles northeast of Tivoli, northeastern Refugio County, South Texas. Location is at 1 Landgraf Brothers, in the Pierce Rollins Survey. Drilling is scheduled to go to 8,200 ft.

White Drilling Co. is contractor on a wildcat test being started by Wilson & Moore southeast of Cisco field, in Grand County, southeastern Utah. Location is on a state lease in 24-21s-22e.

Cook Drilling Co., Fort Worth, is getting under way on a deep-drilling contract in Sicily Island field, 5½ miles east of Harrisonburg, in Catahoula Parish, eastern Louisiana. It is a Rodessa (Lower Cretaceous) test for Austral Oil Exploration, Inc., of Houston, and Crescent Production Co., of Monroe, joint operators. The test, 1-A Tensas Delta, in 11-9n-7e, is in the north sector of the field. Previous drilling at Sicily Island has been to a Tuscaloosa productive zone at 8,500 ft.

Calvert to Offer Stock To Retire Company Debt

Calvert Drilling, Inc., Olney, Ill., will offer 250,000 shares of common stock to the public in a move to retire the company's debt.

The firm expects to net about $2,450,000 from the sale. The stock will be offered for "not more than $12 per share," a company official said. Underwriters are W. E. Hutton & Co.

Calvert is headed by F. A. Calvert, Jr., as president and chairman of the executive committee. The company owns 12 rigs and operates as a contractor and independent producer.

Production averaged about 1,370 bbl. daily during the fiscal year ending March 31. The company has 9,351 net acres in Oklahoma, Colorado, North Dakota, and the Illinois basin.

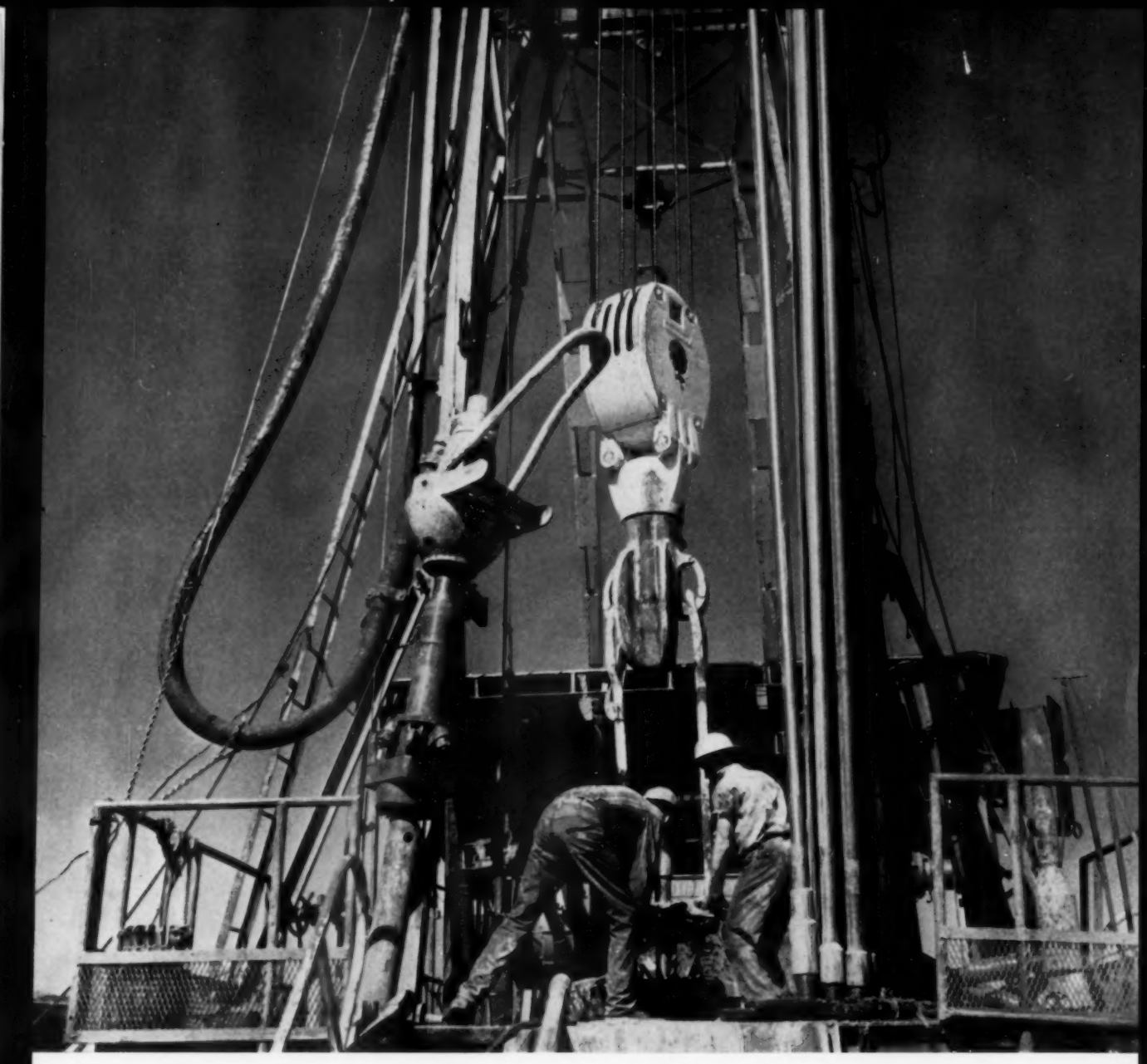
New directors include Floyd A. Calvert, Sr., Oklahoma City; W. L. Kistler, Jr., independent operator, Tulsa; and J. A. W. Iglehart, Adrian C. Massie, and Calman I. Nulman, all of New York City.

Other officers of the company include H. K. Calvert, A. J. Magness, and Howard L. Brockman, Oklahoma City.

Pyburn Drilling Co., Shreveport, is well down on a new wildcat test it is drilling for Robert F. Roberts about 9 miles southwest of Sulphur Springs, in Hopkins County East Texas. The test, at 1 Dry, in the Thomas Lee Survey, is contracted to 8,700 ft. or 300 ft. into the Travis Peak.

Crow Drilling & Producing Co., Shreveport, has a rig under contract to Durbin Bond & Co., Inc., of Little Rock, Ark., for a 5,400-ft. wildcat test 2½ miles south of Sicily Island field, in Catahoula Parish, eastern Louisiana. Location is at 1 Jones heirs, in 35-9n-7e.

Vasser & Brown, Inc., Natchez, Miss., is on a new contract operation in Concordia Parish, eastern Louisiana. It is a 6,500-ft. Wilcox test for R. H.



WIRE ROPE AT WORK

This trim outfit belongs to Zephyr Drilling Corporation, Tulsa. It's trailer-mounted; travels a lot. But our photographer caught up with it at Harrisburg, Nebraska, not far from historic Scotts Bluff. There, in a picturesque setting on the prairie, it was making hole fast through fairly soft shale. Drilling had progressed to 2500 ft.

The rotary line was Bethlehem 1-in. 6 x 21 Seale, Purple Strand grade. This durable wire rope had logged approximately 54,000 ft of drilling, and was still going strong. It had the necessary "muscle" for handling heavy loads, plus the toughness that greatly reduces bending fatigue. An excellent choice from every standpoint, including cost per foot of hole drilled.

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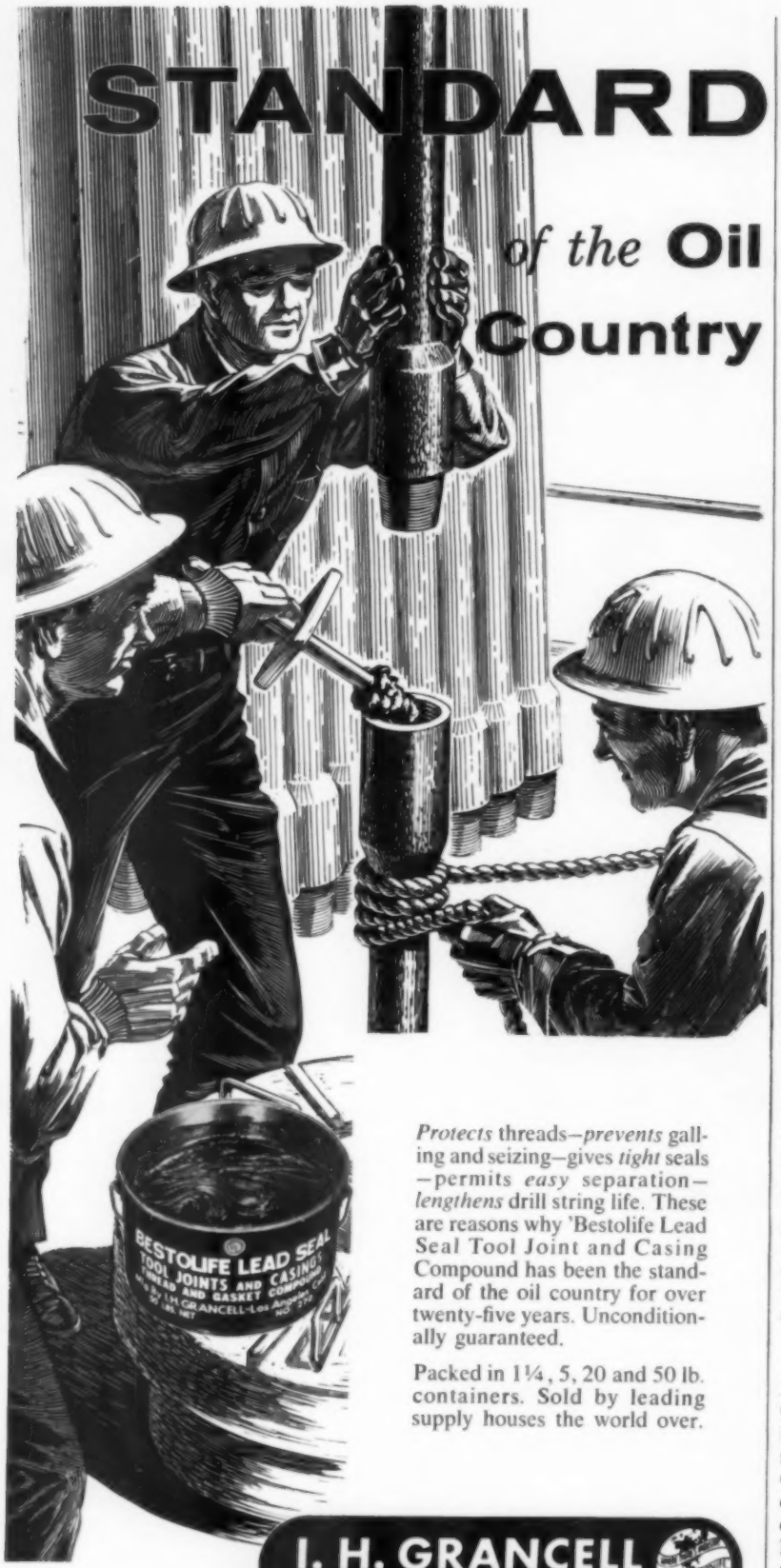

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1601 E. NADEAU STREET, LOS ANGELES 1, CALIF.

Alagood and Norton Oil Corp., Inc., of Shreveport, at 1-E Wursted-Madison, in 11-6n-8e. Location is about 5½ miles west of Willetts. This is about 4½ miles southeast of Horseshoe field, nearest production.

D. B. McConnell, Shreveport, has a 6,000-ft. Rodessa test under way in the revived old Zwolle field, in Sabine Parish, West-Central Louisiana. It is a contract job for Frank E. Anderson, of Olney, Ill., at 2 Bauer & Barthod, in 25-8n-12w. Another new operation in the revived shallow field is a 2,300-ft. Chalk test for Major Oil Co., of Houston, at 1 Sabine, in 25-8n-12w, on which **H. M. Bell,** of Beaumont, Tex., is contractor.

Eilers Drilling Co., New Iberia, La., has a new contract operation in Beauregard Parish, southwestern Louisiana. It is an 8,200-ft. test for Flaitz & Mitchell and Mayfield Co., and will offset a lone oil well (West Juanita discovery well) completed in April 1955 by Houston Oil Co. (now Atlantic Refining Co.). It is the first test started since the discovery well was completed. The new operation is at 1 Doornbos, in 15-5s-11w, east of the discovery. Production of the discovery well was in a 5,600-ft. sand.

Penrod Drilling Co., Shreveport, has a rig on a wildcat location 3 miles northwest of Bearhead Creek field, in southwestern Beauregard Parish, southwestern Louisiana. Drilling is for H. L. Hunt, one of the owners of the contracting company. The new Penrod job, scheduled to go to 9,000 ft., is at 6 Lutcher-Moore, in 10-6s-12w. It also is about 3½ miles northeast of the east extension of Bancroft field.

Carl B. King Drilling Co., Midland, Tex., has taken on a 15,000-ft. test to be drilled for Zapata Petroleum Corp. and Liedtke & Liedtke at a wildcat location in northeastern Lea County, New Mexico. Location is 8 miles south of Tatum, in 3-14s-36, on Zapata's Danglade lease. It is 8 miles southwest of King field, and about the same distance northwest of Denton field, nearest production.

Stewart & Gauger Drilling Co., San Antonio, has the contract to drill Union Oil Co. of California's newest location in the East Lake Palourde area, in southern Assumption Parish, Louisiana Gulf Coast. It will be a 14,500-ft. test on a state water-bed lease on the east edge of Lake Palourde, near the St. Martin parish line. Location is on the southwest flank of East Lake Palourde Lake field.

SHOWCASE...

NEW EQUIPMENT

Tubing Anchors Maintain Tension Automatically

Two new Baker tubing anchors are now available. One trips mechanically by rotation of the tubing string. The other is tripped hydraulically by fluid in the tubing.

Designated compensating tubing anchors, the devices are of the fully automatic type in that they permit the tubing to move freely downward but prevent its moving upward.

After pumping is started with empty tubing, the anchor permits the tubing to elongate more and more as it is being filled and both pressure and temperature rise. This allows the tubing to seek its most elongated position.

The anchors differ from conventional tension type of anchors in that the tension is not applied from the surface. Instead it results from the natural elongation of the tubing and the fact that the anchor prevents the tubing from contracting. In addition, the anchors automatically compensate for later elongation due to changes in well conditions such as lowering of fluid level as reservoir pressure declines and changes in fluid density as water-cut increases.

Both models of the anchor have been provided with a quick, positive release. **Write or call: Baker Oil Tools, Inc., Box 2274 Terminal Annex, Los Angeles 54, Calif., for details on compensating tubing anchors.**

Prefabricated Building Saves Time, Labor

Drilling contractors, refiners, producers, and others may find this new Porta House, a portable prefabricated field office or tool shed, a labor and time-saving device. It's made of lightweight marine plywood in 3-ft. panels.

The structure can be put together by one man in 1 hour, and completely dismantled and moved to a new site on a pickup truck, the maker claims. It can be enlarged to almost any length and width by adding 3-ft. modueles.

When necessary, the building can be reduced easily in size as the job finishes or when storage requirements lessen.

As a tool shed or field office, the unit can be moved to a new drilling site, without using cranes, skids, winches, heavy equipment or extra manpower.

It is available on both a purchase and a rental basis. The rental service includes delivery, erection, and removal from the site. **Write or call: Porta House Co., 6767 Broadway Terrace, Oakland, Calif., for details on Porta House.**

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

.....

Described in OIL AND GAS JOURNAL - Issue of August 26, 1957

NAME..... TITLE.....

COMPANY.....

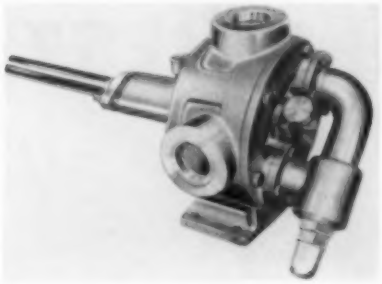
ADDRESS.....

CITY..... STATE.....

DATE.....

SHOWCASE . . .

New Equipment



Rotary Pump Comes in 27 Models

This pump is one of a new line of Wheatley rotary pumps now available. Parts for the new pumps are interchangeable with the rotary pump previously supplied.

The rotary-pump line will include models for refinery, petrochemical plant, L.P.G., and pipeline service. A total of over 27 models will be available. **Write or call: Frank Wheatley Pump & Valve Mfgr., Box 1948, Tulsa, Okla., for details on rotary pumps.**

●

Overlapping Interlocking.

Tubing Protectors Prevent Erosion

Because of their convenient size, these new overlapping and interlocking rubber tubing protectors can be stretched on tubing in an overlapping series to present a formidable length of solid rubber protection for tubing as it passes through an upper pay zone, the maker says. The lip of one protector laps over the tongue of the next. And their shoulders butt tightly together so no abrasive matter gets through to the tubing.

To protect the longer production string in dual completions from erosion by abrasive sands at the upper perforated producing zone, protectors, as necessary, can be put on with standard PB installation tools.

Made of oil-resistant synthetic rubber, the protectors come in two types—overlapping and interlocking. Each is 6½ in. long (installed length). Both are made for 2⅜ and 2⅞-in. tubing. **Write or call: Byron Jackson Tools, Inc., P. O. Box 2017A, Terminal Annex, Los Angeles 54, Calif., for details on PB tubing protectors.**

●

New Scraper Gives Clean Casing Wall

Here's a new casing scraper that removes all foreign material from the inside bore of casing, assuring full clearance for all tools run in the hole and providing a clean wall for the correct seating of packers, the maker says.

The tool, of rugged design, is considerably shorter than conventional scraping tools. It gives a 360° scraping action from a single row of scraping elements. The tool is leased to the user for the life of the scraping element, after which it is returned. **Write or call: Gulf Oiltool Co., 6423 Foster, Houston 21, Tex., for details on casing scraper.**

●

Plastic-Cork Tape Stops Line Sweating

Sweating of cold-water pipes can be stopped permanently in one easy application with this No-Drip tape, the maker claims. The tape forms an airtight jacket around pipes. It needs no extra vapor-seal tapes or overwraps.

A plastic-cork eight-strand tape, it goes on easily and quickly. Simply hand wind it spirally around the pipe or tube. It can be used on tees, unions, and angles too, the maker points out. The tape is self-adhering. Thus bands, brads, or fasteners aren't needed. Each roll contains 16 ft. of tape 2 in. wide by ¼-in. thick. **Write or call: J. W. Martell Co., 550 Hibbe, Kanakee, Ill., for details on No-Drip tape.**

●

Lightweight Winches Have 8,000-Lb. Capacity

A rated lifting capacity of 8,000 lb. is provided by these new MS 3 and MSU 3 Series Braden winches. Outstanding improvements in the winches, the maker reports, include larger base angles that provide high load capacity, secured by heat-treated capscrews for increased shear strength.

An internal thrust ring in the housing has removed all lateral motion from the bearing leg by placing pressure at a point of greater strength. The worm gears are made of aluminum bronze to increase the stress load. Heat-treated hardened keys are used for increased shear strength. The drum shafts are made of alloy steel. **Write or call: Braden Winch Co., P.O. Box 547, Broken Arrow, Okla., for Bulletins MS3-10-5610 and MSU3-10-5610.**

●

Direct-Reading A. C. Hour Meter Keeps Record

With this new square-faced a.c. hour meter, a direct-reading type, you can log the total hours of machine or equipment operation. The square-face meter, particularly suitable for panel mounting, has a white-face dial with black figures and will match other electrical instruments.

The meter is available in 120, 240, and 480 volts, in 50 or 60 cycle. **Write or call: John W. Hobbs Corp., Springfield, Ill., for Catalog AC 587B.**

●

Valve Bumper Loosens Ball-and-Seat Valves

Here's a new valve bumper for oil-well pumps that permits freeing of stuck ball-and-seat valves safely, the maker claims. A screw type of device,

it slips over the polished rod and clamps in place.

Replacing the usual crosshead or saddle block on the pumping unit, it permits sucker rods to be raised or lowered as desired—even when the pump operates under full load—by simply turning a nut. Simple in operation, the device can be controlled closely. The bridle connects directly into the threaded crosshead.

When a ball-and-seat valve sticks at the bottom of a well, the operator can lower the rod string until the cylinder bumps the valve enough to free it. The valve can then be raised back into place. This is said to eliminate the usual risk of jerking too hard, having the sucker rods part, or pushing the bottom out of the pump.

The valve bumper also can be used to compensate for sucker-rod stretch in new wells. The device comes in several sizes for various well depths and pumping conditions. Except for replacing the saddle block with the valve bumper, no change is required in the usual pumping equipment. **Write or call: Safety Crank Co., Centralia, Ill., for details on valve bumper for pumping wells.**

●

Electronic System Gives Flow Rate, Total Flow

The electronic gas-flow measuring system shown here measures the flow of gas through an orifice plate by means of electrical signals proportional to the flow rate and accumulated flow. An adapter adjusts the instrument's calibration to the conditions of measurement. Adjustments for changes in the measuring problem can be quickly and easily made, according to the maker, by changing the plug in the adapter.

The accumulated volume in standard cubic feet is automatically registered on a mechanical counter. It can also be recorded on a strip chart. A strip chart is used to record quantity rate of flow. Other types of recording devices are available and easily connected.

Applications for the electronic computer include metering in automatic well-testing systems, gas sales lines, gas-transmission lines, gas-distribution systems, and processing systems. The computer can also be used to control the flow of liquid or gas, or to monitor flow, the maker points out. **Write or or call: Oil Metering and Processing Equipment Corp., 4843 Yale Street, Houston 18, Tex., for details on electronic gas-flow measuring system.**

●

Nonflanged Casing Head Made for Low-Pressure Wells

Here's a nonflanged casing head for low-pressure wells that's compact and rugged, the maker says. Known as the LT head, the unit is available in sizes of 8⅝, 9⅝, and 10¾ in.

A slip-suspension head, it has a full-opening type of body furnished with two 2-in. line-pipe side outlets. The slips are a three-piece type, hinged to facilitate handling.

A packing seal is effected by tightening cap screws in the packing assembly, causing the bottom ring to move away from the slips. This does not add to the slip load, according to the maker. A ring clamp holds the packing assembly in place. The cap screws are accessible for tightening at any time.

The head has been tested to 3,000 lb. under the packing and a slip-load test of 190,000 lb., equivalent to 8,000 ft. of 7-in. o.d. 23-lb. casing. **Write or call: Petroleum Industry Equipment Div., Alco Products, Inc., P. O. Box 1065, Schenectady, N. Y., for details on Type LT casing head.**

●

Self-Emulsifying Solvent Cuts Engine Grease

In repair and mintenance shops, this Super Concentrate cleaning compound may prove valuable for removing grease from engines, floors, and equipment. A self-emulsifying solvent, it reportedly permits engine degreasing faster than with steam, without harmful effects.

Because the solvent is a high-boiling product, it won't evaporate from a warm engine block, according to the maker. And the solvent won't short out generators and starter winding or harm electrical systems.

When rinsed with water, grease is emulsified so it will not clog drains or present a danger of fire. The solvent is available in containers in sizes of 2 to 400 lb. **Write or call: Curran Corp., Lawrence, Mass., for details on Super Concentrate solvent.**

●

Semiautomatic Valve Eliminates Battery Drain

A built-in circuit breaker in this new Murphy Model MV-7199 semiauto-

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

.....

Described in **OIL AND GAS JOURNAL** - Issue of **August 26, 1957**

NAME.....TITLE.....

COMPANY.....

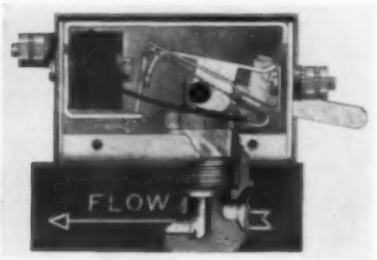
ADDRESS.....

CITY.....STATE.....

DATE.....

SHOWCASE . . .

New Equipment



matic magnetic fuel shutoff valve for diesel engines eliminates battery drain after shutdown, according to the manufacturer. Any battery with a voltage of 4 to 32 volts can be used to close the valve, including the regular engine-starting battery or a 6-volt hotshot.

Simple to install and wire, the valve connects to any Murphy temperature or pressure-gage switch. Its specifications include: (1) a ¼-in. port, (2) ⅜-in. IPT connections, (3) a machined brass body, and (4) over-all dimensions of 3 by 2¾ by 2 in. **Write or call: Frank W. Murphy, Mfgr., 3131 South Sheridan Road, Tulsa, Okla., for details on Model MV-7199 fuel shutoff valve.**

GET THE FACTS . .

MAXIM

SILENCERS

Dimensions, installation data, applications, all packed into Maxim's informative data sheets. Find out about the *new* Maxim Exhaust and Intake Silencers . . . more compact, lighter, tough as ever, and at a *new* low cost.

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☐ INTERNAL COMBUSTION AND STEAM ENGINE EXHAUST AND INTAKE ☐ AIR COMPRESSOR INTAKES AND DISCHARGES ☐ VACUUM PUMP DISCHARGES

☐ BLOWER INTAKES AND DISCHARGES ☐ STEAM, AIR OR GAS DISCHARGES ☐ JET AIRPLANE ENGINE EXHAUST AND INTAKE

NAME _____

COMPANY _____

ADDRESS _____

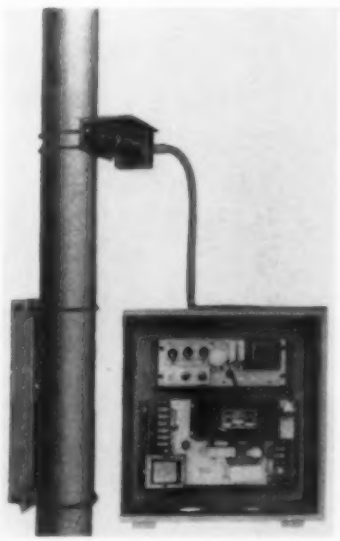
_____

One-Cylinder Diesel Develops 6 Hp., Weighs 220 Lb.

Light weight and portability are features cited for this new Model AC-1 diesel engine. Air-cooled and having one cylinder, it's a four-cycle 6-hp. engine.

Operating at 1,800 r.p.m., it weighs only 220 lb. Models are available in both air or water-cooled types in sizes from 5.5 to 25 hp. **Write or call: Waukesha Sales & Service, Inc., 1422 Maury Street, Houston 10, Tex., for details on Model AC-1 M.A.R.C. diesel engine.**

•



Level-Indicating Equipment Doesn't Touch Material

This new JSP level-measuring equipment is never in contact with the process material. And it cannot be affected by corrosive liquids, the maker reports. It is easily installed on the outside of a process pipe without drilling of holes or welding of brackets.

Designed in cooperation with the Atomic Energy Commission, the JSP-173A is said to provide a positive means of recording and controlling the level of any process material—from water or distillates to a slurry of finely

Dowell Guide to Acidizing . . .

1 DEVONIAN
Lea County, New Mexico

Vugular formation usually below 12,000 feet. Common treatment is 500 gals. Mud Acid, followed by 3000 gals. acid with Dowell wetting and emulsion control agents. Results: wells often potential from 1500 to 1800 bopd.

2 MADISON
Williams County, North Dakota

Highly fractured vugular limestone of low porosity. Permeability seldom over two millidarcys. 90 to 92 per cent soluble. Usual treatment: Acid Petrofrac® — 250 gals. fluid per foot. Results: wells often test 200 to 1000 bopd.

3 D-1
Lac St. Anne Area, Alberta, Canada

Tight dolomitic formation. Responds well to Mud Acid wash, followed by 2000 to 4000 gals. Dowell acid with agents to control silicate swelling and emulsion. Results vary but generally considered profitable by the operator.

4 ELLENBURGER
Andrews County, Texas

Usually below 13,000 feet. Often needs only 500 to 1000 gals. Mud Acid. Where further stimulation is needed, 5000 to 20,000 gals. Dowell X Acid with silicate control and anti-emulsifying agents is used to good effect.

5 McCLOSKY
Clay County, Illinois

Oolitic limestone formation, 12 to 30 feet thick at about 3000 feet. Responds well to 5000 gals. Dowell acid containing surface tension reducing agent and a non-emulsifying agent. Results: wells often produce 240 bopd after acidizing.

6 RODESSA
Cass County, East Texas

Oolitic limestone at about 6000 feet. Usual treatment: 1000 gals. Dowell acid with wetting agent. Then 2000 gals. Channeling Acid and 10,000 gals. Dowell acid with wetting agent. Results: wells often test over 700 bopd.

These are just six examples of Dowell acid treatments that are being used successfully under widely varying conditions. Whatever *your* well conditions, call Dowell for dependable, profitable stimulation treatments. Dowell Incorporated, Tulsa 1, Oklahoma.

Services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

DOWELL has the fracturing service to help you unlock your formation

WHAT'S your formation?
Limestone, chert, dolomite, sand?
Each one's different and there are many variations within each general formation.

That's why Dowell has developed eight basic fracturing services—each for a specific purpose in stimulating well production. Also, numerous chemical additives have broadened the range of these *basic* treatments to make them even more effective in widely-varying formations.

But Dowell is not stopping here. Still better materials, techniques and equipment are being developed by Dowell's field and laboratory research groups. The Dowell organization—chemists, engineers, field personnel—is a team you can count on to help you unlock *your* formation. Dowell Incorporated, Tulsa 1, Oklahoma.

*Service Mark of Dowell Incorporated

Services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

New Equipment

crushed ore—over a range from 6 to 48 in.

Because the equipment is easy to install and remove, and because of its immunity to the elements and corrosive action, it's expected to prove suitable for many applications. **Write or call Instruments, Inc., Box 556, Tuisa, Okla., for details on JSP-173A level-measuring equipment.**

●

Wire-Line Tubing Stop Gives Bypass Area

Here's a new tubing stop for wire lines. The stop features a design with a large bypass area—in 2-in. tubing it is equivalent to a 1-in. opening and in 2½-in. tubing it is equivalent to a 1½-in. opening, the maker reports.

The specially designed slips will support shock loads up to 100,000 lb. Positive holddown on the slips reportedly insures maximum running speed without prematurely setting the slips. The holddown is released by jarring down. There is no danger of disturbing the corrosion products in the tubing because there is nothing on the tool that will scratch or rub, the maker claims. The body of the stop is of Type 4140 heat-treated steel. **Write or call: Harold Brown Co., 2417 Bassonnet, Houston, Tex., for details on wire-line tubing stop.**

●

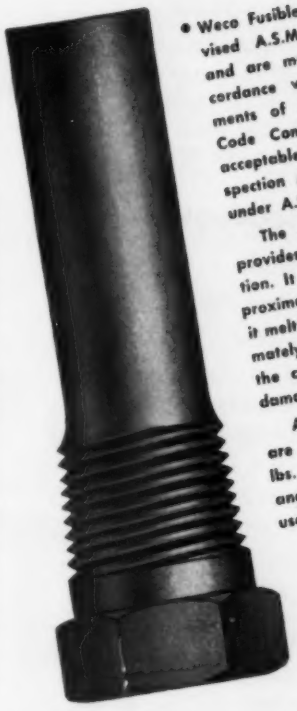
Quadrangle Map Covers Coastal Texas, Louisiana

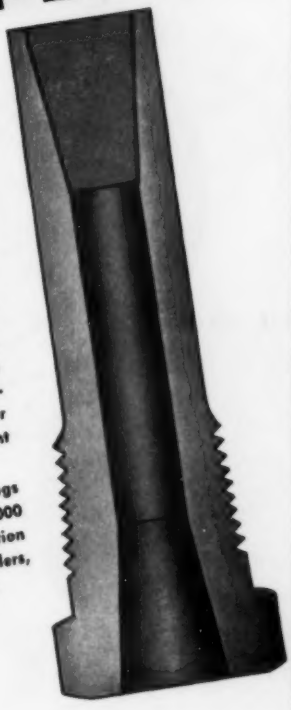
Here's a new Zingery quadrangle series of ownership and oil maps covering coastal Texas and Louisiana. Each quadrangle covers 7½ minutes square of latitude and longitude. Made on a scale of 1,000 ft. to the inch, each quadrangle contains about 64 sq. miles, measuring 42 by 48 in.

Drafted on glass cloth to insure absolute stability, the maps will match perfectly one to the other when joined, the company says. **Write or call: Zingery Map Co., 1315 McKinney, Houston, Tex., for details on new quadrangle series of maps covering coastal Texas and Louisiana.**

BOILER SAFETY!

WECO FUSIBLE PLUGS





• Weco Fusible Plugs meet revised A.S.M.E. requirements and are made in strict accordance with the requirements of the Power Boiler Code Committee. They are acceptable to all Boiler Inspection Authorities working under A.S.M.E. codes.

The ¾"×4" Fusible Plug provides additional protection. It will melt out at approximately 450 deg. F. When it melts-out it leaves approximately 9/16" of water over the crown sheet to prevent damage.

All Weco Fusible Plugs are kerosene tested to 1000 lbs. pressure. For protection and safety of your boilers, use Weco Fusible Plugs.

WECO FUSIBLE PLUGS

SIZE	NO.	WEIGHT
½" x 2⅛"	1093	5 oz.
½" x 2¾"	1087	6 oz.
½" x 3½"	1081	8 oz.
¾" x 2⅛"	1091	8 oz.
¾" x 3"	1085	10 oz.
¾" x 3" Lg. Thd.*	1097	10 oz.
¾" x 4"	1079	12 oz.
¾" x 4" Lg. Thd.*	1095	12 oz.
1" x 2-5/16"	1089	12 oz.
1" x 3"	1083	13 oz.
1" x 4'	1077	16 oz.

*1½" Thread length

U-11-56

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

WECO®

Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

fmc

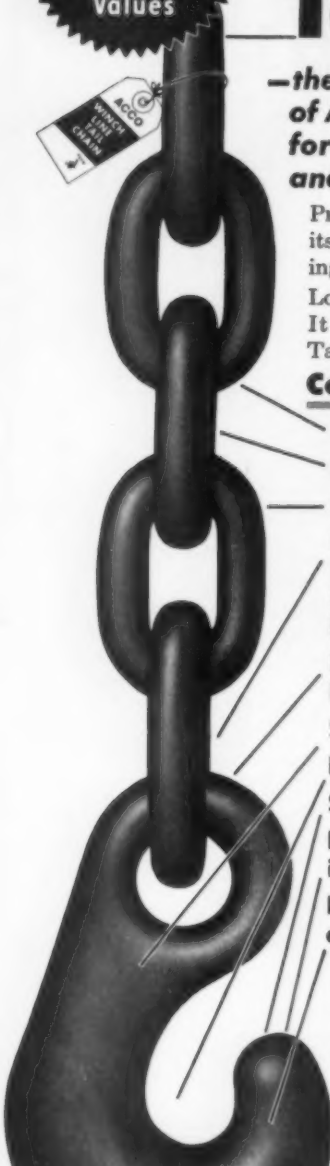
ACCO for Better Values

Winch Line Tail Chain®

—the Registered Trade Mark name of ACCO's flexible end member for wire rope used on truck and tractor winch lines

Proved best for operations which require its wrapping around machinery for lifting, loading, skidding or hauling.

Look for the ACCO tag when you buy. It identifies the genuine Winch Line Tail Chain.®



Compare these features

- Heat-treated chain
- High carbon steel links
- Short flexible links
- Link joining chain to hook is welded at factory, hence is as strong as balance of unit
- Drop-forged hook of heat-treated alloy steel
- Sturdy design
- Narrow throat
- Safety point on hook
- Hook design prevents injury to wire rope
- Hook will not distort at breaking strength of rope

SIZES: ½", ⅝" and ¾", available in Accoloy X-weld or HC High Test; also, ⅞" and 1", available in Endweldur 125 or HC High Test. Length of 2 largest sizes, 24"; length of other sizes, 18" (length is exclusive of hook).

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WEED TRUCK CHAINS
—engineered for oil field use

ACCO BOOMER CHAINS
—meet rugged oil field conditions

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ACCO TRADE MARK

SHOWCASE . . .

New Literature

Selecting Electric Generating Plants in sizes to 75 kw. is discussed in this new 34-page pocket sized booklet. The booklet describes three general groups of small electric plants: alterating current, direct current, and battery charging. Plant operation for each type is thoroughly discussed. The booklet reviews three types of prime movers which furnish mechanical power for driving a generator—gasoline, diesel, and gas engines. It discusses the cost of operation and installation of each type too. And it compares the different means of engine cooling, describes starting methods, and sums up important points to remember in selecting an electric generating plant. **Write or call: D. W. Onan & Sons, Inc., Minneapolis 14, Minn., for a copy of "Electric Generating Plants."**

•

An Introduction to Camco, Inc., is provided by this new 16-page brochure. The well-illustrated brochure gives an interesting history of Camco and then goes into the subject of oil reservoirs and why they eventually need some method of artificial lift to maintain oil production. After explaining the advantages of gas lift for increased production from a reservoir, the brochure goes into the plans for future growth at Camco and its management's objectives and company policy to stockholders, employes, and customers, closing with a glossary of terms used in connection with oil production and gas lift. **Write or call: Camco, Inc., Box 14484, Houston 21, Tex., for brochure, "Introducing Camco, Inc."**

•

Drilling-Mud Service. Maps and geological listings in this new 20-page booklet provide the name and location of distributors of Baroid mud products. The comprehensive booklet also presents the names and addresses of the company's field engineers who render drilling-mud service. **Write or call: Baroid Div., National Lead Co., P. O. Box 1675, Houston 1, Tex., for booklet on drilling mud service.**

•

"The Master Story of the Quincy Plant," a 16-page publication, shows with numerous photographs, the sequence of events and the equipment involved in manufacturing L.P.G. tanks—from the arrival of material to the movement of a finished tank into the yard ready

for delivery. Equipment of interest includes a vacuum lift for moving steel plate from the material cars to a conveyor and an automatic unloader for moving finished tanks, one at a time, out onto a conveyor. **Write or call: Master Tank & Welding Co., 2000 South Front Street, Quincy, Ill., for bulletin, "The Master Story of the Quincy Plant."**

●

Hydraulic-Pumping Unit Nomograph. This new Texsteam nomograph reportedly consolidates all the factors essential to the selection and powering of long-stroke hydraulic pumping units. Complete instructions plus a simple heavy-lined nomograph permit rapid calculation of hydraulic-pumping-unit requirements by untrained personnel. **Write or call: Texsteam Corp., 320 Hughes Street, Houston, Tex., for a copy of hydraulic-pumping-unit nomograph.**

●

Gas Lift Valves, Otis Type C, ranging in sizes from ¾ by 1¾ to 2½ by 4 in. are illustrated and described in this new multicolor four-page foldout. The literature contains full-color illustrations, including cutaway sections of the equipment and flow courses. The foldout explains how the valve operates and a table gives strength and flow-port data. **Write or call: Otis Pressure Control, Inc., P. O. Box 35206, Dallas, Tex., for foldout on Type C gas lift valves.**

●

Wall-Cake Removers, Scratchers, Latch-On Centralizers, and Casing Scrapers are featured in this new four-page bulletin. Devoted to Hub Oil Tool products, the three-color bulletin shows how the downhole equipment is useful for well cementing. It explains how the equipment functions and what its advantages are. **Write or call: Hub Oil Tool Co., Inc., 1112 North Market Street, Shreveport, La., for bulletin on downhole tools.**

●

L.P.G. Engines and how they can save truck operators money are explained in this new six-page leaflet. Devoted to Hall-Scott products, the leaflet sets out 11 reasons why many truck operators use L.P.G. engines for their trucks. **Write or call: Hall-Scott, Inc., 2850 Seventh Street, Berkeley 10, Calif., for leaflet on L.P.G. engines.**

●

Emulsion Treater, the Moran Type P, is described in this new multicolor eight-page brochure. Providing complete specifications on two shell series—the

Another SOUTHERN MILL Prefabricated Home
Designed for Gracious Living

INDIVIDUAL APPEARANCE . . .
REGARDLESS OF SIZE

In the drawing above notice how by integrating the roof line of the house and garage, a long, low, modern look is obtained. This is just one example of how a standard STURDYBILT three bedroom home can be styled to suit individual needs. Write for information.

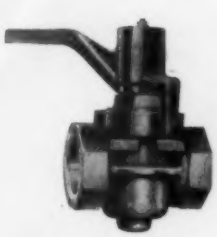
STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA.

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

IT'S AS SIMPLE AS THIS..

No other valve Performs
Like a DeZurik Valve
because
No other valve is made
Like a DeZurik Valve!



Exclusive eccentric action and resilient-faced plugs give tight shut-off and easy quarter-turn operation WITHOUT LUBRICATION! Get more details; representatives in all principal cities, or write

DeZURIK CORPORATION
SARTELL, MINNESOTA

overwhelmed...

With the performance of his

oilmaster

HIGH-VOLUME PRODUCER PUMP

In a water flooding operation, or in the later life of a water drive field, the problem of pumping large quantities of water is a very real one. Some operators change to a larger size tubing at a considerable increase in capital expenditure. Others produce all they can with a tubing-type pump running at the maximum possible stroke and motion. A third alternative is the new Oilmaster High-Volume Producer Pump.

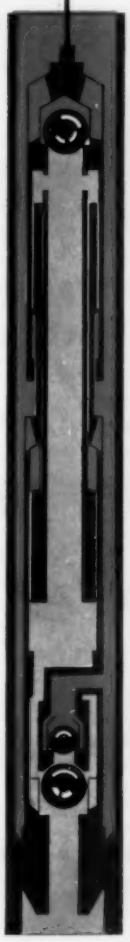
The Oilmaster High-Volume Producer Pump, as the name implies, is specifically designed to handle large quantities of fluid. It is actually two pumps operating in tandem, capable of displacing far more fluid than is possible with a single pump. The upper pump is barrel travel, providing the strength and rigidity so desirable in the traveling assembly of a pump, while the lower pump is plunger travel, with the excellent pump suction characteristics needed for producing large volumes of fluid. The High-Volume Producer Pump discharges fluid both at the top and bottom of the pump, displacing the fluid with a minimum of pressure drop and keeping the annulus between the pump and the tubing flushed free of sand.

If lifting large volumes of fluid is one of your requirements, ask your Oilmaster Representative about the High-Volume Producer Pump, and prepare to be OVERWHELMED when you find how much fluid can be produced with an Insert Rod-Type Pump from a given size tubing.

FLUID PACKED PUMP CO.

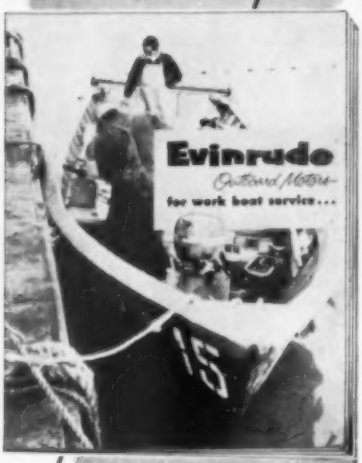
Main Office and Plant, Los Nietos, California

Distributed by the National Supply Co., Pittsburgh, Pa.
Export: The National Supply Co., Export Division, 600 Fifth Avenue, New York
Co-Distributors: Union Supply Company, Beacon Supply Co., Industrial Supply Co.



Schematic drawing of Oilmaster High-Volume Pump shown on upstroke. Note how the full lower pumping chamber fills directly from the standing valve while the upper annular chamber fills through the hollow polished rod. On the downstroke, fluid is discharged both from the valve in the top cage and from the bottom discharge valve above the hold-down.

new book



☆ gives you the facts on

modern

OUTBOARD POWER

for

oil field

service

TODAY there's a *new kind* of outboard power for work boat duty! A complete line of new Evinrude *Aquasonic* models so advanced in capability, stamina, and smooth, quiet operation that they set entirely new standards of performance. Get the facts! Send coupon for booklet.

EVINRUDE MOTORS
Division of Outboard, Marine & Mfg. Co.
4632 N. 27th Street, Milwaukee 16, Wisconsin

Send me booklet on outboard power for work boat duty.

Name.....

Address.....

City.....Zone...State.....

(In Canada: Mfd. by Evinrude Motors of Canada, Peterborough)

20 ft. and the 27½ ft.—the brochure uses a multicolor flow diagram to explain the operating principle and design features of the treater. A selection table gives the complete specifications for both treater series and shows that they offer oil-treating capacities from 100 to 3,600 bbl. per day and water capacities from 50 to 8,300 bbl. per day, at a working pressure of 25 psi. **Write or call: Moran Tank Co., Inc., P. O. Box 1069, Shreveport, La., for brochure on Type P treater.**

●

Fifty-Nine Shortcuts to Speed Drafting and Computation are compiled in this new handy booklet called, "Time Saving Tips for the Draftsman and Engineer." Clearly written and well illustrated, this booklet shows new approaches to old problems. The section on calculating ideas contains 10 tips including easy ways of: (1) remembering the signs of trig functions, (2) dividing a circle into parts, and (3) locating decimal points. **Write or call: Reader Service Div., Frederick Post Co., 3650 North Avondale Avenue, Chicago 18, for booklet, "Time Saving Tips for the Draftsman and Engineer."**

●

Valve Disks, Gaskets, and Metallic Rings are detailed in this new 20-page catalog devoted to Metallo Gasket Co. products. Convenient tables list gasket dimensions for pipe sizes from ½ to 24 in. in A.S.A. ratings through 1,500 lb. Four pages illustrate and describe the construction and applications for 22 different gasket designs, including ring-joint, delta, round, and octagonal types. Additional pages describe special gaskets for a variety of uses. The catalog explains the applications for both rashig and lessig rings for packing of towers and gives the rings' available materials and sizes. **Write or call: Metallo Gasket Co., 10-18 Bethany Street, New Brunswick, N. J., for catalog on gaskets.**

MECHANICAL ENGINEERS

—to handle product development and sales engineering for prominent manufacturer. Drilling or production experience required. Opportunities open in all active drilling areas. Prefer young men who want to move into engineering sales. Past sales experience is not necessary. Replies held strictly confidential. Write:

Box K-317,
The Oil and Gas Journal, Tulsa, Okla.

ATLANTIC

This is under no circumstances to be construed as an offering of these securities for sale, or as an offer to buy, or as a solicitation of an offer to buy, any of such securities. The offer is made only by means of the Prospectus.

$100,000,000

The Atlantic Refining Company

4½% Convertible Subordinated Debentures

Dated August 15, 1957 — Due August 15, 1987

Price 100%
plus accrued interest

Copies of the Prospectus may be obtained from the undersigned only in those States in which the undersigned may legally offer these securities in compliance with the securities laws of the respective States.

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Merrill Lynch, Pierce, Fenner & Beane — Stone & Webster Securities Corporation

White, Weld & Co.

August 20, 1957

EQUIPMENT MEN . . . in the News

Charles Wheatley Names Huff as General Manager

L. A. HUFF

Lawrence A. Huff has been appointed general manager of Charles Wheatley Co., Tulsa, manufacturer of Stream-Flo valves, and distributor of other oil-field equipment lines. Huff has served 8 years with the Wheatley firm, most recently as head of the purchasing department, which duties he will continue to hold, according to Charles Wheatley, president.

Walter O'Bannon Names Bender as Sales Manager

J. B. BENDER

J. B. (Bob) Bender has been appointed as sales manager for the Walter O'Bannon Co., according to Walter O'Bannon, Jr., general manager. Bender served with Century Geophysical Corp. from 1947 to 1954, and in 1955 he became general manager of American Kloeckner-Moeller Corp.

Monsanto Names Two to Organic Chemicals Posts

L. Edward Klein and Dr. David T. Mowry have been appointed assistant directors in the development department of Monsanto Chemical Co.'s organic chemicals division at St. Louis.

Both Klein and Mowry move up from section managerships within the department. Klein has been in charge of development work on intermediates and exploratory chemicals since 1952 while Mowry has been responsible for fine chemicals development since 1955.

Klein joined the department as a project specialist in 1947. Mowry joined Monsanto's central research laboratory at Dayton, Ohio, in 1941 and became a research group leader there in 1944. He transferred to the company's former phosphate division in 1952 as manager of chemical development and moved to the organic chemicals division's development department in 1954.

Mid-Continent Equips Barge for Producers Drilling

Executives shown here at the christening of the W. F. Youngblood include: Peter Bednar, vice president, Levingston Shipbuilding Co.; Ed Malloy, president, Levingston; Jesse Vint, president, Unit Rig & Equipment Co.; J. A. Daugherty, vice president, Mid-Continent Supply Co.; W. F. Youngblood, vice president, Producers Drilling Co.; Jerome Goldman, president, Producers Drilling; D. H. Thornbury, executive vice president, Mid-Continent Supply Co.; and Leonard Glade, secretary and treasurer, Producers Drilling.

The W. F. Youngblood, a drilling barge owned by Producers Drilling Co. of New Orleans, was christened recently at Levingston Shipbuilding Co.'s yards in Orange, Tex., and was put to work immediately.

Mid-Continent Supply Co. was prime contractor for all machinery and equipment, the barge hull, and rig-up under a turnkey contract. The barge was designed by Friede & Goldman, New Orleans marine architects and engineers.

The W. F. Youngblood is a slotted-type steel submersible drilling barge, equipped by Mid-Continent to drill wells to depths of 20,000 ft. It has a main level for support of the derrick and drilling equipment to permit operation in water depths up to 17 ft.

Included among the major items of machinery selected by Producers Drilling Co. for the W. F. Youngblood is a Unit Rig U-1220 draw works, Unit Rig LS-1420-A compound, and Unit Rig 27½-in. rotary table.

The slush pumps are two Emsco D-1000's with K-20 Hydril pulsation dampeners. The mast is a 142-ft. Lee C. Moore cantilever type of 1,000,000 lb. capacity.

Power for the rig is supplied by four D-397 Caterpillar diesel engines. Auxiliary a.c. electric power is provided by Unit Rig generating equipment incorporating Caterpillar D-375 diesel engines with 250-kw. generators.

The W. F. Youngblood

Grant-McClatchie Agent Changes Company Name

The firm name of Floyd Moore Sales & Service of Casper, Wyo., has been changed to Rocky Mountain Specialty Warehouse Co. The company is exclusive distributor for Grant Oil Tool Co. and MacClatchie Manufacturing Co. oil-field products in the Rocky Mountain area. Wayne Connors is the manager.

Consolidated Forms New Division, Names Wiley

Consolidated Electrodynamics Corp. has established an analytical and control instrument division and has named Harold F. Wiley as director of the division. The new division will consolidate company activities in the design, development, and manufacture of analytical and control electronic instruments. Products will include CEC's established line of mass spectrometers, chromatographs, moisture monitors,

LEE C. MOORE

TRAILER MOUNTED MASTS

The top section of Lee C. Moore trailer mounted masts is retractable for greater mobility. Mast legs are in true alignment during drilling operations to assure maximum strength and rigidity.

LEGS IN TRUE ALIGNMENT NO OVERLAP . . .

SINGLE TRAILER MOUNTED MASTS
86 ft 94 ft. 97 ft. 97 ft. Heavy duty
100 ft. 126 ft. Export Model

DUAL TRAILER MOUNTED MAST
97 ft. 100 ft. 126 ft. 126 ft. Export Model

LEE C.
Moore
CORPORATION

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FOREIGN LICENSED MFR. OIL WELL ENGINEERING CO., LTD., CHEADLE HEATH, STOCKPORT, ENGLAND

and other analytical, control, and process-monitoring equipment.

The new unit, to be housed in the company's main plant facilities in Pasadena, brings to eight the number of divisions operated by CEC in southern California. Consolidated also has a high-vacuum division in Rochester, N. Y.

Wiley has been with Consolidated since it was formed in 1937.

Other appointments in the new division were Armand F. DuFresne, chief engineer; Lewis G. Farmer, manager, production; Henry Landsberg, manager, quality control; Arthur L. Schleppy, manager, material; and Donald W. Cook, manager, administration.

Sivalls Names Sales Mgr., Sales Representatives

G. C. HILTON

Appointment of Gregg C. Hilton as sales manager and Jim Kennedy and Lowell Light as sales and service representatives has been announced by S. P. Kroeker, executive vice president of Sivalls Tanks, Inc. All three will headquarter at the firm's offices in Odessa.

Hilton will be in charge of the company's sales program which centers on Odessa, Midland, San Angelo, Abilene, Borger and Fort Worth. He joined Sivalls Tanks in June 1957, following 2 years as a special representative for B. F. Walker, Inc., Fort Worth. He worked for Sivalls Tanks as a salesman and later as coordinator of production and sales from 1949 until 1953.

JIM KENNEDY

LOWELL LIGHT

Kennedy joined Sivalls as a trainee in December 1956. Upon completion of shop and field training, he was assigned to the Crane-McCamey-Iraan-Fort Stockton-Monahans territory as a sales and service representative. Light joined Sivalls as a trainee iin March 1957 and is now assigned to the territory centering on Big Spring, Snyder, Colorado City and Lubbock. He worked as a mud engineer for Permian Mud Service prior to joining Sivalls.

Wyatt Purchases Mexican Metal Fabricating Plant

Wyatt Metal & Boiler Works, Inc., has purchased the plant of Productos de Hierro y Acero, S.A., a metal-fabricating concern with headquarters in Mexico City. T. J. Uhl, who was production manager at Wyatt's Dallas, Tex., plant, has been named manager of the Mexican concern, which will be operated as a wholly owned subsidiary of Wyatt.

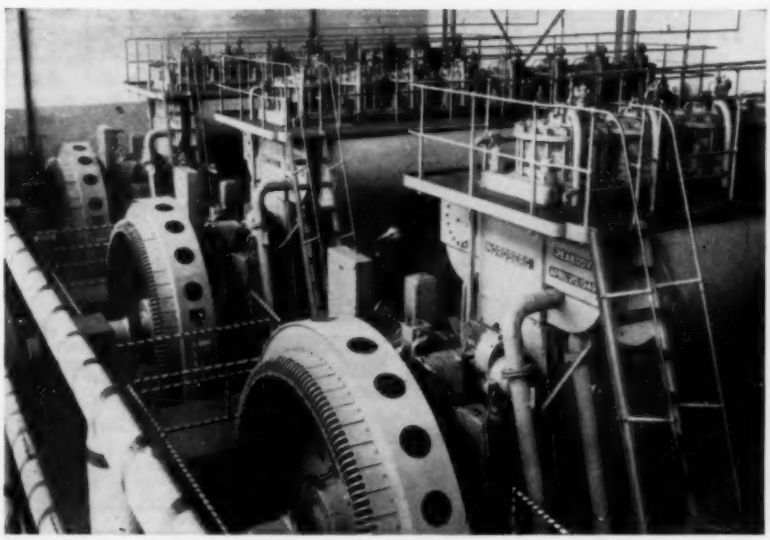
The plant outside the Mexican capital is equipped to do fabrication similar to that produced in the Houston and Dallas shops of the parent firm. Wyatt's management intends to enlarge facilities in Mexico. Meanwhile, customers in Mexico will be served by Wyatt's Texas plants as required.

Insul-Mastic Purchased by Pittsburgh Coke & Chemical

Assets of the Insul-Mastic companies of Summit, Ill., producers of industrial protective coatings, have been purchased by Pittsburgh Coke & Chemical Co., according to W. Kenneth Menke, vice president of the Pittsburgh company.

The newly acquired facilities, near Chicago, will continue production of

Look to COOK for Better Rings!



Peabody, Mass. Electric Company Swears by Cook Piston Rings!

Better Performance Since Installation of Cook Rings!

All three of Peabody Electric Company's 3200 H.P. Diesel engines are shown here. In 1956 these engines were required to operate for 11,375 hours and generated 19,609,100 kilowatt hours. All three were equipped with Cook Piston Rings and gave trouble-free performance throughout the year.

This record is a tribute to Peabody's excellent management and operating personnel — *and* to the outstanding quality of Cook Piston Rings. If you're looking for a seal with the savings built in, write direct, today, for product information and the name of your nearest Cook representative. Address: C. Lee Cook Company, 934 South Eighth Street, Louisville 3, Kentucky.

C. LEE COOK COMPANY

Division of Dover Corporation

Rings and Packings Since 1888

INSTALLING LIQUID LEVEL GAGES

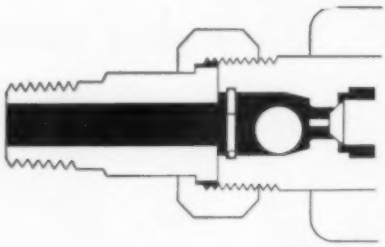
Penberthy "FLOATING SHANK"

lines up off-center holes

Center-to-center variations of vessel tappings or gage assembly can cause costly, inaccurate mounting.

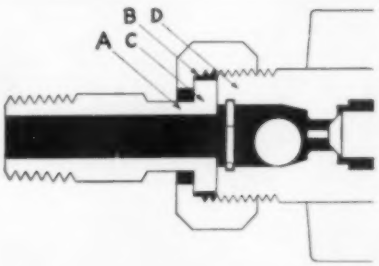
STANDARD SHANK

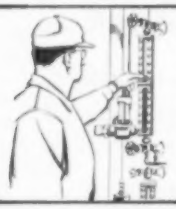
Minimum tolerance between union nut, nipple, and nipple flange prevents *any* corrective movement to compensate for inaccurate tapping. Gage and valve assemblies must either be "force-fitted" or vessel retapped.



FLOATING SHANK

Recessed neck (a) plus wide union opening (b) permit 3/16" movement of flange (c) in ANY direction. Together, "floating shanks" on top and bottom gage valves compensate for off-center tapping errors as high as 3/8". Ground flange (c) assures TIGHT metal-to-metal union with valve body (d).





...eliminates mounting strains

By permitting freedom of movement up to 3/8" in ANY direction, Penberthy "floating shank" principle protects against mounting stresses . . . allows gage and valve assemblies to seek TRUE center-to-center position between inaccurately tapped holes.

AN EXCLUSIVE EXTRA AT NO EXTRA COST

- cuts installation time and replacement costs by 50%
- provides true gage and valve alignment on incorrectly tapped vessels
- eliminates "force-fitting" and subsequent strains on gage and valve assemblies
- prevents possible damage to entire installation
- reduces unnecessary glass breakage due to gage distortion

WRITE for Catalog 36 showing complete line of liquid level gages and valves, Standard or special assemblies available through local suppliers or direct.

PENBERTHY MANUFACTURING COMPANY *Division of Buffalo-Eclipse Corporation*

Dept. J **1242 Holden Avenue** **Detroit 2, Michigan**

Everywhere . . . you're seeing more **PRODUCTS BY** PENBERTHY

EJECTORS
INJECTORS
CYCLING JET PUMPS
LIQUID LEVEL GAGES
GAGE VALVES
SUMP PUMPS

the Insul-Mastic line of asphaltic coatings and insulating materials for sale through the parent company's protective coatings division. The Insul-Mastic sales organization will be integrated with the division's sales force.

Integration of Insul-Mastic products with its Pitt Chem tar-based protective coatings will enable Pittsburgh Coke to offer a complete line of bituminous protective coatings to industry.

Anderson Heads Pfaudler's New Southern District

The Pfaudler Co. of Rochester, N. Y., has established a new southern sales district and named A. G. Anderson as manager, according to H. I. Edwards, general sales manager. James P. Voorhies will take over Anderson's former accounts in Louisiana and Texas. The southern district, with headquarters in Houston, will serve customers in Texas, New Mexico, Louisiana, Mississippi, Alabama, Georgia, and Tennessee.

Anderson, a sales engineer with Pfaudler for 20 years, did engineering and sales work at Pfaudler's Elyria division from 1936 to 1940. He was subsequently assigned to field sales territories in New York City, Chicago and Dallas. Voorhies joined Pfaudler in January and recently completed training at the Rochester plant.

Weatherford Officials Return From European Trip

Jess Hall, Jr., president of Weatherford Oil Tool Co., and Weldon Martin, manager of finance, are shown returning from a month's tour of European countries. Tom Remp, export manager, also made the trip.

The group visited West Germany, France, England, Italy and Luxembourg and while in Paris attended the eleventh International Congress of Scientific Management. In their conferences with U. S. Embassy officials and foreign industrialists, the Houston men discussed the possibilities of establishing oil-field manufacturing and service outlets in the above countries.

Remp called on Weatherford operating companies in Europe, studied the international currency picture and explored possibilities of selling oil-field goods to Europe. He continued on to the Far East and will return to Houston soon.

Davison Names Sales Mgr. For Industrial Chemicals

C. E. MEGINNIS

Charles E. Meginnis has been promoted to sales manager for industrial chemicals, Davison Chemical Co., division of W. R. Grace & Co. He succeeds Lewis C. Reid who has been assigned to other responsibilities in the company as part of an expansion program in new fields.

H. H. Wilson, formerly sales control manager, has been named assistant to Meginnis. R. H. Hermann continues as director of technical service and will report directly to A. R. Worrall, general manager of industrial chemicals.

A. W. Hemphill continues as production manager of all industrial chemicals activities at Davison's Curtis Bay (Baltimore) works, and in addition will be responsible for operation of the new desiccant plant at Gallup, N. M.

Cummins Engine Appoints General Service Manager

C. E. MARTIN

Charles E. Martin has been appointed general service manager and member of the executive committee of Cummins Engine Co., Inc., Columbus, Ind., according to President R. E. Huthsteiner. Martin assumes over-all responsibilities for the service division of the company, succeeding H. E. Bollwinkel, who resigned.

Martin joined the company in 1943 and has been employed in the sales and service divisions of the company. Prior to his recent appointment he was manager of field service.

Field Representative Named by Republic Rubber

James A. Ruck has been named as a field representative by the Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, Ohio, according to G. L. Smith, Republic's general sales manager. Ruck will headquarter in Republic's district office in Chicago.

Under the direction of I. G. Wollter, Republic's Chicago district manager, Ruck will contact the users of Republic's line of hose, belting, packing and molded and extruded rubber products. He will work closely with Vail Rubber Products Corp., Hammond, Ind., Republic's Chicago distributor.

Tracerlab Names Faulkner General Mgr., Engineering

W. Harrison Faulkner, Jr., has been promoted to general manager, engineering and development, of Tracerlab, Inc., according to S. S. Auchincloss, president.

Faulkner, formerly chief engineer of the industrial division, has been with Tracerlab since 1948 and has served as business manager of its western division.

Milton Roy Purchases Anders-Lykens Co.

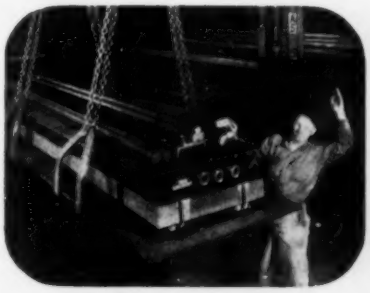
Milton Roy Co., manufacturing engineers of Philadelphia, has purchased Anders-Lykens Co. of Lykens, Pa., manufacturers of instrument air dryers and gas dehydrators. With the approval of the Milton Roy board of directors, Robert T. Sheen, president, completed negotiations resulting in formation of the Anders division of Milton Roy Co.

Edward Anders, founder of Anders-Lykens Co., is director of the new division, which will headquarter at the parent company's main plant and offices in Philadelphia. The manufacture

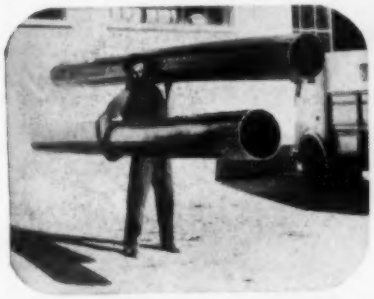
Three ways Ryerson can serve you

You know that Ryerson carries the world's largest steel stocks. And that every piece bears the Ryerson certified seal of high quality.

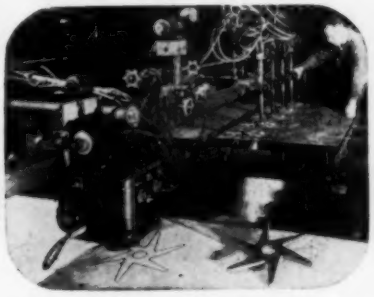
But did you know that there are other important ways Ryerson can serve you? Two of them are illustrated here: plastics and flame-cutting. Complimenting these services is our staff of specialists (men who know your industry's requirements) who work with you. So for *complete* service —call Ryerson.



STEEL FROM STOCK—Carbon steels, alloys, stainless—bars, structurals, plates, sheet and strip, tubing—you can get quick shipment of one piece or truckloads from the world's largest steel stocks, at Ryerson. Get the steel with the certified seal—of quality.



PLASTICS FROM STOCK—The convenience and dependability of Ryerson service is also available to buyers of industrial plastics—PVC pipe, valves and fittings, sheets and rods, rigid Kralastic pipe, flexible polyethylene pipe and tubing, etc.



FLAME CUT STEEL SHAPES—Your nearby Ryerson plant can quickly flame cut almost any shape from carbon, alloy or stainless steel—producing a single piece or thousands accurate to size and ready for your application. We take the work load—you save money.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. PHILADELPHIA • CHARLOTTE • CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

of air dryers and gas dehydrators will continue at Lykens with present personnel and management.

Oilwell Names Two as Field Representatives

Berl T. Stark has been named as field representative at Houma, La., by United States Steel Corp.'s Oil Well Supply Division, according to M. F. Jones, Gulf Coast area manager. Appointed as field representative at Dawson Creek, B. C., Canada, is Russell C. Birdsell, it has been announced by W. A. Weir, Canadian area manager.

Stark previously was employed by Oilwell from 1948 to 1951 at Houston. Birdsell joined Oilwell in 1956 at Drayton Valley, Alta. He had 3 years' oilfield-supply experience prior to his employment with Oilwell.

Sutherland Joins Cable

W. C. (Dub) Sutherland, Jr., has joined Cable Engineering, petroleum engineering firm of Wichita Falls, Tex. Since 1954 Sutherland had worked for Continental Oil Co. as field supervisor of drilling, completion and workover at Ardmore, Oklahoma City, Eunice, N. M., and Odessa.

Fluor Names Cash as Advertising Manager

WALTER C. CASH

Walter C. Cash has been named advertising manager of The Fluor Corp., Ltd., Los Angeles engineering - construction firm. He succeeds Walter E. Terry, who has joined Johnson & Lewis, San Francisco advertising agency. Cash was assistant merchandising director, western division, of Foote, Cone & Belding, advertising agency, before joining Fluor. Prior to that he was a partner in the advertising agency, Pardee, Cash & Associates, Los Angeles.

Joy Names Schlobohm as Regional Sales Manager

Joseph H. Schlobohm has been appointed regional sales manager of the European and Middle East areas for Joy Manufacturing Co. and its oil field division, Baash-Ross Co. He was formerly located in Cairo, Egypt, but will now headquarter in Paris.

Wilmarth Named American Meter's Midwest Manager

Raymond B. Wilmarth has been named manager of the Midwest division of American Meter Co. He will headquarter in Chicago, according to C. B. Dushane, vice president in charge of sales. American Meter Co. manufactures a wide range of measurement and control instruments for the gas, petroleum and chemical industries.

Wilmarth joined American Meter as a sales engineer in 1936. He became assistant manager of the Midwest division in 1946 and division engineer in 1951.

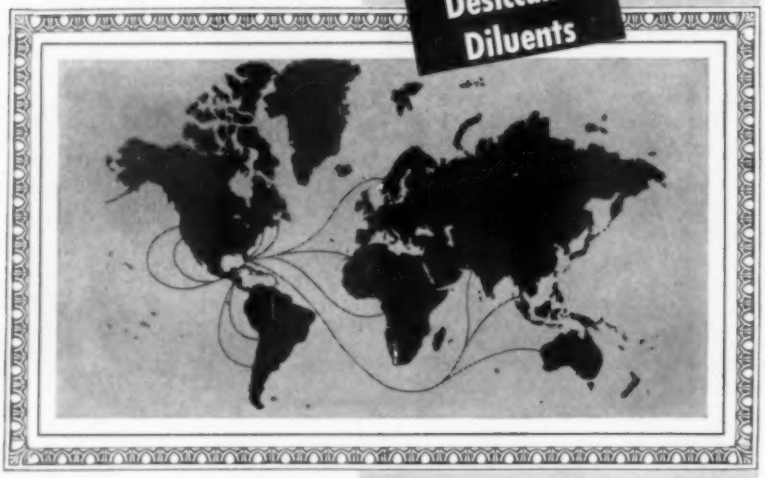
Nelson Electric Adds Layman, Michaels to Staff

Neil F. Layman has been named as assistant personnel manager for Nelson Electric Manufacturing Co., according to Ernest T. Schoenwald, executive assistant. Clifford W. Michaels, Jr., has been appointed advertising assistant, it has been announced by Carl J. Nash, marketing manager. Both men will be located at the Tulsa headquarters.

Michaels, a former technical editor for Dowell, Inc., will assist Charles A. Saville, advertising manager and assistant sales director.

Floridin

Adsorbents
Desiccants
Diluents



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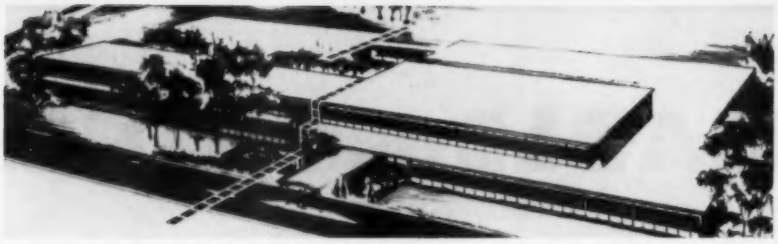

Magcobar Plans to Expand Office-Laboratory Facility

Construction is expected to start in October on expansion of Magnet Cove Barium Corp.'s office and laboratory building, according to Floyd A. Enz, vice president and secretary-treasurer.

The proposed expansion, shown to the right of the broken line, will add 33,500 sq. ft. to the Magcobar facility, more than doubling the building's present 29,000 sq. ft. Another 4,000 sq. ft. will be added to an adjacent garage building.

Blackmer Pump Names Assistant Sales Manager

G. E. PERKINS

Gordon E. Perkins has been appointed assistant sales manager, marketing, of Blackmer Pump Co., Grand Rapids, Mich., according to Britton L. Gordon, president.

Perkins was with Houdaille Industries, Inc.'s, executive sales division for 6 years prior to joining Blackmer Pump.

Mountain Iron Expands Facilities Into Texas

Mountain Iron & Supply Co. has established a sales office in the Fidelity Union Life Building in Dallas and named Allen A. Staub to be in charge of the operation, according to S. O. Beren, president of the oil-field supply company. At the same time Lee R. DeWeese was promoted to Texas district sales manager, working out of Perryton.

ALLEN A. STAUB

L. R. DeWEESE

Texas becomes the fifth midwestern state in which Mountain Iron operates. The firm has seven branch stores in Kansas, as well as stores in Oklahoma, Nebraska and Colorado.

Staub, vice president and secretary of Mountain Iron, goes to Dallas from the company's home office in Parkersburg, W. Va. He has been with the company 12 years. DeWeese has been store superintendent at Plainville, Kans.

National Moves District Office to Wooster, Ohio

Offices of the Michigan-Ohio-Pennsylvania district of The National Supply Co., formerly at Titusville, Pa., have been transferred to the Quinby Building, Wooster, Ohio. W. D. Crawford is district manager.

The district includes the company's oil-field and water-well supply stores in Mount Pleasant, Reed City and West

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Tidewater's Delaware Refinery is another major petroleum installation depending on Allis-Chalmers control for continuous day and night operation. This growing trend reflects industry confidence in Allis-Chalmers modern controllers for petroleum requirements.

For more information about how Allis-Chalmers experience in the petroleum industry can help you, contact your nearby A-C sales office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5430

Tidewater Oil Company Refinery. This night scene shows the 130,000-bbl-per-day crude unit, where uninterrupted service is vital to successful operation.

Branch, Mich.; Bradford, Butler, and Titusville, Pa.; and Logan, Wooster and Zanesville, Ohio.

National Supply has general offices in Pittsburgh.

Schramm Names Henry as Sales Promotion Manager

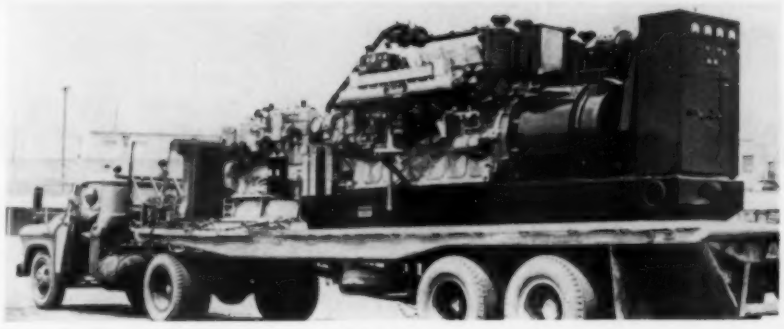
Pat Henry has been appointed sales promotion manager of Schramm, Inc., West Chester, Pa. George B. Comfort, who formerly served in that capacity since 1954, has been assigned to a special project within the company.

Prior to joining Schramm earlier this year, Henry had been sales promotion manager of Willson Products division, Ray-O-Vac Co., Reading, Pa., for several years.

Western Promotes Brown as Dallas Research Director

William E. Brown has been promoted to director of research in the Dallas laboratory of The Western Co., oil-well servicing concern, with headquarters in Midland, according to H. E. Chiles, Jr., president.

Brown started work for Western as a research associate in Dallas in 1955. He worked for Gulf Research & Development Co. in Pittsburgh and in Gulf's geology and geochemistry division before joining Western.



Warren Refinery Uses Giant Waukesha Enginators

Warren Petroleum Corp.'s refinery at Madill, Okla., is being rebuilt since it was struck by a tornado in April. One of its new features will be three Waukesha V-12 Enginators for intermittent service to supply electrical energy for certain refining processes and as a reliable source of electricity in the event of power-line failure.

The Waukesha Enginators are individually skid-mounted engine-generator sets, like the one shown above.

Payne Manufacturing Names Decker, Freymann, Yates

M. E. (Jinx) Decker has been named sales representative and chief pilot by Payne Manufacturing Co., Houston. Enrique Freymann has been made service representative in Mexico City, and C. B. (Bill) Yates is agent for the Rocky Mountain area covering seven states. He is located in Casper, Wyo.

Decker, who will be located in Houston, has had 16 years' oil-field experience in Texas, Oklahoma and Louisiana. For the past 6 years he was sales representative and pilot for Cameron Iron Works, Inc.

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The Model 112 Kinzbach Automatic Pressure Relief Valve for Mud Pumps gives positive, instantaneous pressure relief at maximum volume and automatic restoration of circulation upon correction of the overpressure condition. All elements of the circulating system are protected from excessive pressure at all times.

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Kinzbach Model 112 Pressure Relief Valves come in 2" and 3" sizes and pressures ranging from 500 psi to 16,500 psi. Write for complete catalog or see your Composite Catalog.

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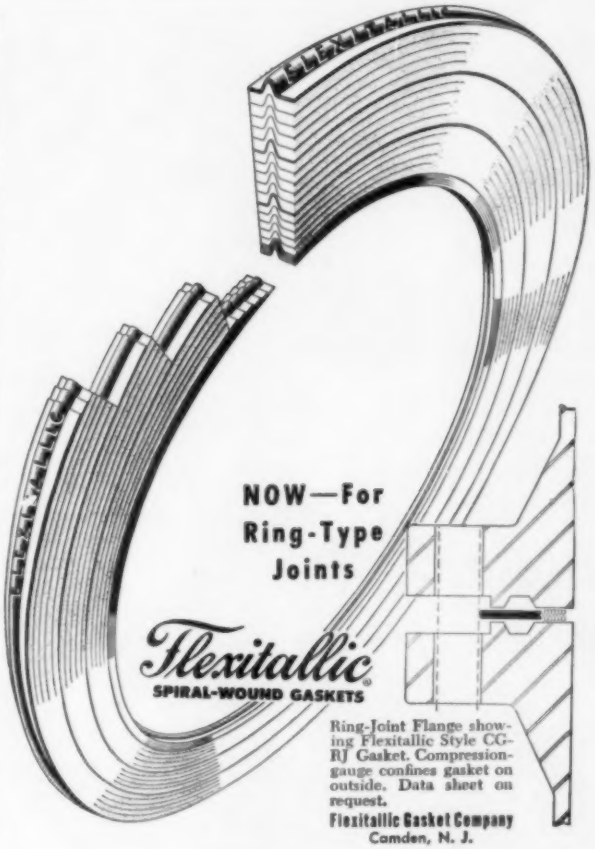

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Ring-Joint Flange showing Flexitallic Style CG-RJ Gasket. Compression-gauge confines gasket on outside. Data sheet on request.

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Juan Fangio, driving a Maserati, rounding Tobacco Corner at speed during the Monaco Grand Prix, which he won using BP Fuels and BP Energol Motor Oil.

BP SETS THE PACE

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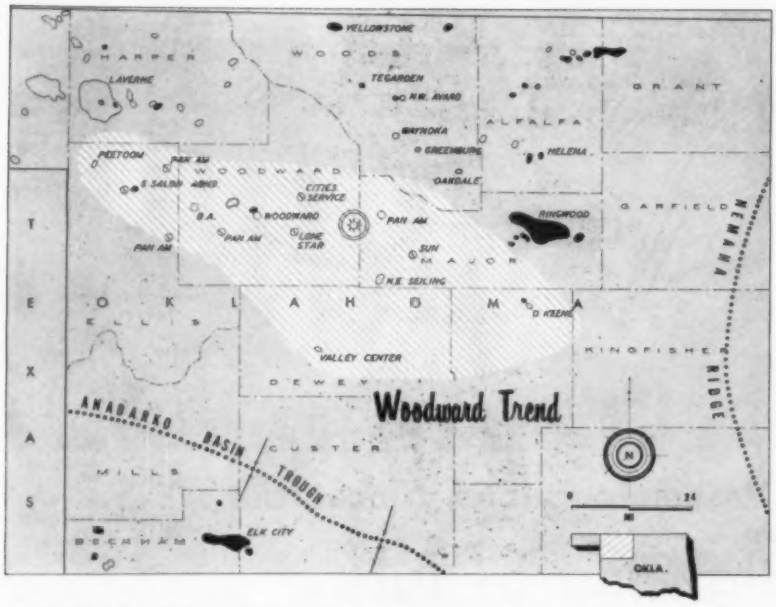


NEW DISCOVERIES at both the eastern and western extremities indicate a 100-mile trend of Morrow and Chester production in northwestern Oklahoma.

Oklahoma's Woodward Trend Stretches 100 Miles

By Frank J. Gardner
Exploration Editor

FIVE MONTHS AGO, this column pointed to Oklahoma's Woodward County as the focal point of a newly developing trend. At the time, readers were advised to "sit, wait, and watch" as four rank wildcats punched their way down along it. Of the four, two have since been completed as discoveries; these were Shell Oil Co. 1 Peetoom in northwestern Ellis County, and Champlin Oil & Refining Co. 1 McDonald, Woodward County's second field opener, 6 miles west of the original Woodward strike. Both were Morrow-Pennsylvanian gas wells.

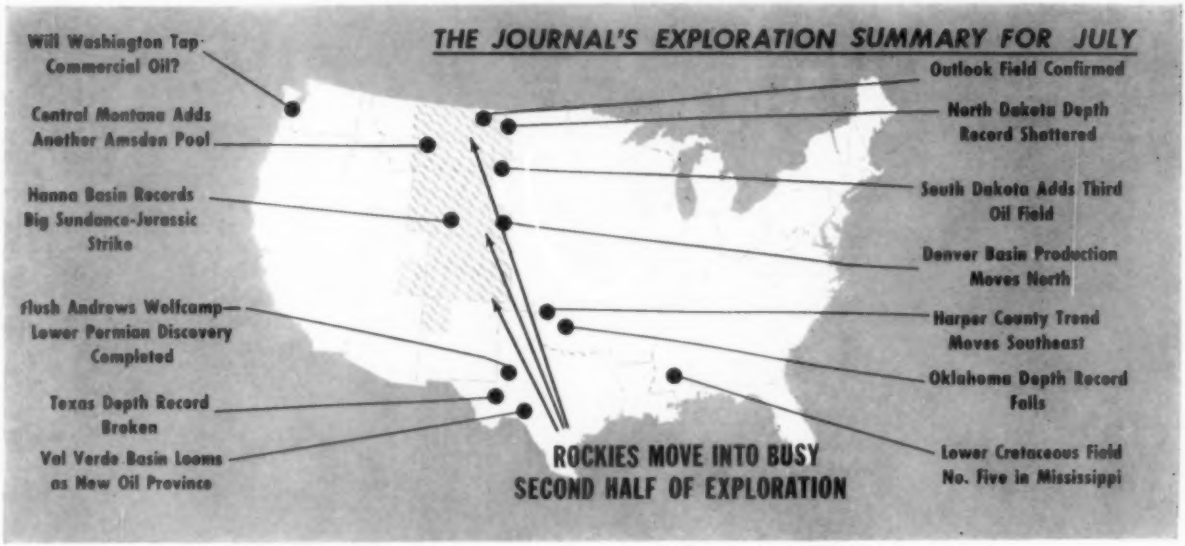
A new province . . . Where there were four active wildcats last March, today there are nine (see map). And there'll be many more before the tale is told. The discovery at Woodward unleashed a wave of large-block leasing clear across northwestern Oklahoma, in a trend parallel to the Canadian River. In a swath from Harper County on the northwest to Kingfisher County on the southeast, land that had been going for a dollar an acre jumped within a a week to 10 and 20. And as wildcatters begin to evaluate their buys, you'll see a new province emerge on this northeastern shelf of the Anadarko basin. In short, the busy Beaver-Harper County play is receiving a long southeastern projection.

The newest accent to this southeastern surge lies in extreme eastern Woodward County, just west of the Major County line. Here, double-circled on the map, is Shell's 1 Garvie, an important new discovery in Section 26-22n-17w; now in process of completion, this strike flowed gas and condensate from two sets of Chester-Mississippian perforations at 7,294-7,314 and 7,236-58 ft. A hoped-for dual completion up the hole in Musselem - Missourian sand didn't materialize. Shell is drilling its second well in the area, now called Northeast Cedardale, and has applied for 640-acre spacing over a 20-section area surrounding the discovery.

And a chain of fields . . . Thus a major new link in the chain of Mississippian and Pennsylvanian fields on the shelf has been forged. It's about 36 miles from the new Shell well to the Okeene area (a Chester reservoir) of northeastern Blaine County on the southeast. And halfway between, Sun Oil Co. is now sinking a key wildcat in southwestern Major County. This is Sun 1 Rumsey in Section 25-21n-16w. Operators will carry this one to 8,000 ft. seeking Chester production. If it hits, the chain will be complete for nearly 100 miles across the waists of five northwestern counties. Geologists in this trend envision a huge strat trap of regional importance, with production control dependent upon wedgeouts of Pennsylvanian and Mississippian sands, chiefly of Morrow and Chester age.

Sun's wildcat, and an Arbuckle test by Pan American 10 miles northwest of it (the 1 Harris in Section 13-22n-16w), will be closely watched for subsurface clues to wedgeout limits. Preliminary guesses indicate the Chester sand limit will lie somewhere in between the two. A strike at either one will project Major County into the middle of the play, however. Wildcatters in this particular county have paid close attention to the log of Continental Oil Co.'s 1 Kimball, the 1952 discovery well at Northeast Seiling pool. This seismic discovery found a complete geologic section clear to the Arbuckle, topped at 11,705 ft.; it was completed in Chester at 8,452 ft. for 134 bbl. a day of very high-gravity oil, but the pool has never been developed. It was the forerunner of the present active play.

In a game of follow the leader . . . But the explosive charge that really set off the Woodward trend was Union Oil Co. of California 1 McCormick, first producer in Woodward County; this was the discovery attributed by its operator to the "three G's—geology, geometry, and guts" (OGJ, 12-17-56, p. 177). It sparked the land play and aroused new wildcatting interest in this neglected area, where no less than 10 possible pay zones lie at reasonable depths. Someday, someone may sit down and analyze neglect, and the factors that contribute to it; until then, wildcatters will continue to play follow the leader as they've now done again in northwestern Oklahoma.


THE JOURNAL'S EXPLORATION SUMMARY FOR JULY
Will Washington Tap Commercial Oil?
Central Montana Adds Another Amsden Pool
Hanna Basin Records Big Sundance-Jurassic Strike
Flush Andrews Wolfcamp—Lower Permian Discovery Completed
Texas Depth Record Broken
Val Verde Basin Looms as New Oil Province
Outlook Field Confirmed
North Dakota Depth Record Shattered
South Dakota Adds Third Oil Field
Denver Basin Production Moves North
Harper County Trend Moves Southeast
Oklahoma Depth Record Falls
Lower Cretaceous Field No. Five in Mississippi
ROCKIES MOVE INTO BUSY SECOND HALF OF EXPLORATION

All eyes turn toward Washington's lone wildcat, but . . .

Rockies Get Big Play in July

By John C. McCaslin
District Editor

THE first month of the last half saw much of the nation's wildcat action centered in the Rocky Mountain states. Exploration in this province is definitely moving up, particularly in fringe areas of the Denver basin, the Powder River basin, the San Juan basin, northwestern Colorado, the Williston basin, and in the Paradox basin.

The State of Washington provided the month's wildcat excitement with a report of first real commercial oil production in the Pacific Northwest. Information is nil on this oil strike, however, and a wait-and-see attitude is in order. The well that may be the news maker of the year for exploration is Sunshine Mining Co. 1 Madina, rank wildcat in Grays Harbor County. The well reportedly flowed 400 bbl. of oil per day on drill-stem test of the Nye-Lower Miocene, and was shut in.

July was also a month of depth records. The deep wildcat drill broke the drilling-depth record in Texas, Oklahoma, and North Dakota.

July in the Rockies

San Juan basin . . . Near-record drilling is under way in northwestern New Mexico's San Juan basin. New Gallup sand oil discoveries and confirmations are providing plenty of drilling tempo in this region.

Another Gallup sand trend is shaping up in San Juan County between Bisti and Blanco fields. Three new wells were added in one week just northwest of Gulf Oil Corp.'s 1 Blackrock-Federal gas discovery.

Denver basin . . . Successful exploration in this Colorado-Nebraska basin is showing signs of recovery. There were three new pools opened in western Banner County near the Nebraska-Wyoming line, and first production in Scotts Bluff County gave the basin a new producing area.

Tom Vessels, Jr., and Strain Drilling Co. moved basin production 12 miles north of previous limits in western Nebraska at 1 State-A. The Scotts Bluff County discovery pumped 109 bbl. of oil daily from the Dakota "J" sand.

Hanna basin . . . Pan American Petroleum Corp. tapped one of the largest Sundance-Jurassic wells ever recorded in Wyoming at 1 UPRR-Anschut Ranch, 6 miles southwest of South Big Medicine Bow field in Carbon County.

The well flowed oil at the rate of over 4,000 bbl. per day on tests. Hourly rate was 175 bbl. on ¾-in. choke from 6,485-6,519 ft. Operator is drilling ahead with plans to test the Tensleep at about 8,500 ft.

The daily potential of this well makes it one of the outstanding discoveries of the year in the Rockies. Geologically, the well is in the east portion of the Hanna basin.

Central Montana . . . Another Amsden producing area went on the books in July. Champlin Refining Co. and Republic Natural Gas Co. 2 Government, 1 mile west of Ivanhoe Dome production, separated by dry holes, flowed oil at the daily rate of 320 bbl. from the lower bench of the Amsden "B" sand at 4,130 ft.

Williston basin . . . The Outlook area continues its command over this basin's exploratory success. Amerada Petroleum Corp. confirmed Outlook field at 1 West, flowing 246 bbl. of oil in 16 hours through open hole in the Silurian at 9,086-96 ft. Other tests are under way at 1 Norager to the southeast and at 1 Grinker to the northwest.

. . . South Dakota. Shell Oil Co., the discoverer of oil in South Dakota, opened the state's third oil field, and the second in the Williston basin portion of the state. The 32-17 Graves, west of Buffalo field, pumped 144 bbl. of oil per day and 59 bbl. of water per day from Red River-Ordovician. The other field in South Dakota is a small Leo-Pennsylvanian pool in Custer

Total July Completions, Exploration and Development

	Total completions							Wildcat wells								Act.
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	D.D.	op.
Arkansas	115	69	0	1	45	0	347,320	4	0	0	0	4	8,717	2	0	9
Alabama	8	4	0	0	4	0	54,148	18	0	0	0	18	71,391	3	0	55
California	170	112	0	6	52	0	712,148	47	4	0	2	41	228,763	0	1	225
Colorado	71	11	0	13	47	0	360,865	46	5	0	3	38	237,541	0	0	69
Florida	1	0	0	0	1	0	12,748	1	0	0	0	1	12,748	0	0	0
Georgia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Illinois	189	66	0	1	122	0	447,490	59	1	0	0	58	123,249	65	0	360
Indiana	38	13	0	0	25	0	64,802	4	0	0	0	4	5,085	30	0	83
Kansas	333	135	0	37	150	11	1,174,476	72	6	0	1	65	266,067	41	0	568
Kentucky	113	38	0	13	62	0	170,965	24	0	0	1	23	33,362	93	0	173
West	100	38	0	1	61	0	128,491	24	0	0	1	23	33,362	80	0	130
East	13	0	0	12	1	0	42,474	0	0	0	0	0	0	13	0	43
Louisiana	302	158	2	30	112	0	2,215,436	51	8	0	4	39	455,613	0	2	400
North	126	64	0	9	53	0	465,069	20	1	0	0	19	84,663	0	0	62
South	126	68	1	16	41	0	1,299,972	25	6	0	3	16	306,767	0	2	250
Offshore	50	26	1	5	18	0	450,395	6	1	0	1	4	64,183	0	0	88
Michigan	41	19	0	7	14	1	118,921	9	2	0	0	7	26,740	23	0	85
Mississippi	27	5	2	0	20	0	206,841	16	2	1	0	13	124,445	0	0	40
Montana	37	20	0	1	16	0	188,900	13	1	0	0	12	66,026	9	0	62
Nebraska	97	32	0	1	64	0	560,006	54	3	0	0	51	304,268	0	0	51
West	95	32	0	1	62	0	554,273	53	3	0	0	50	301,722	0	0	48
East	2	0	0	0	2	0	5,733	1	0	0	0	1	2,546	0	0	3
New Mexico	167	84	0	55	28	0	786,249	19	5	0	1	13	95,653	3	2	273
Northwest	81	23	0	51	7	0	336,540	7	3	0	0	4	31,928	0	0	146
Southeast	86	61	0	4	21	0	449,709	12	2	0	1	9	63,724	3	2	127
New York	39	17	0	0	4	18	52,522	3	0	0	0	3	13,796	39	0	42
North Dakota	21	10	0	0	11	0	140,602	10	0	0	0	10	45,261	0	0	31
Ohio	78	39	0	14	21	4	158,689	2	0	0	1	1	7,321	75	0	135
Oklahoma	428	217	8	27	153	23	1,474,306	42	5	0	5	32	197,899	49	11	899
Oregon	1	0	0	0	1	0	8,726	1	0	0	0	1	8,726	0	0	2
Pennsylvania	47	13	0	16	8	10	171,705	1	0	0	0	1	5,511	42	0	91
South Dakota	4	0	0	0	4	0	6,359	4	0	0	0	4	6,359	0	0	0
Texas	1,825	1,048	31	36	695	15	7,652,637	441	28	3	3	407	1,911,558	119	10	1,236
Dist. 1	98	45	1	1	51	0	253,063	36	2	0	1	33	109,773	2	0	45
Dist. 2	72	18	9	7	38	0	438,181	27	1	1	0	25	170,878	0	0	35
Dist. 3	126	54	9	1	62	0	800,725	33	1	1	1	30	266,367	0	4	114
Dist. 4	103	39	7	3	51	3	477,654	31	2	1	0	28	155,401	0	0	69
East	104	56	1	0	45	2	452,459	32	1	0	0	31	137,670	0	0	77
Dist. 7-B	252	116	0	3	133	0	817,594	83	6	0	1	76	262,087	38	1	87
West	520	421	1	3	91	4	2,645,909	67	9	0	0	58	394,522	30	0	576
Dist. 9	415	200	0	5	204	6	1,231,195	118	6	0	0	112	358,227	49	5	123
Dist. 10	135	99	3	13	20	0	535,857	14	0	0	0	14	55,633	0	0	110
Utah	20	5	0	2	13	0	95,037	11	1	0	2	8	43,269	0	0	63
Virginia	10	0	0	9	1	0	51,512	0	0	0	0	0	0	10	0	1
Washington	1	0	0	0	1	0	4,326	1	0	0	0	1	4,326	0	0	3
West Virginia	48	2	0	39	7	0	129,084	2	0	0	1	1	14,121	45	0	261
Wyoming	68	21	0	4	37	6	299,677	26	4	0	2	20	119,802	13	0	131
July 1957	4,299	2,138	43	312	1,718	88	17,666,497	981	75	4	26	876	4,437,610	661	26	5,350
June 1957	3,748	1,961	30	286	1,405	66	16,145,379	781	85	4	30	662	3,893,513	598	38	5,142
Cum. 1957	30,060	15,705	265	2,190	11,267	633	125,411,364	6,795	728	61	264	5,742	32,908,791	4,451	284	
Cum. 1956	33,808	18,263	292	2,263	12,422	568	137,266,000	7,392	986		246	6,160	35,478,000			

Note: C.T.—Cable-tool comp. D.D.—O.W.D.D. Act. op.—Active operations.

Western Canada

	Total wells					Cum.	Wildcat wells					Cum.
	Total	Oil	Gas	Dry	Footage	1957	Total	Oil	Gas	Dry	Footage	1957
Alberta	136	85	13	38	711,111	826	43	7	4	32	232,491	232
Saskatchewan	141	107	2	32	613,260	704	34	9	2	23	140,141	172
Manitoba	31	20	0	11	71,595	158	6	1	0	5	17,254	40
British Columbia	13	1	9	3	84,301	57	8	0	6	2	59,409	34
Northwest Territories						3						3
Total	321	213	24	84	1,480,267	1,748	91	17	12	62	449,295	481

County in the extreme east fringe of the Powder River basin in the southwest corner of the state.

. . . North Dakota. The deepest hole in North Dakota, and indeed in the Williston basin, is Amerada's 9-A Unit in Beaver Lodge field. The well is down below 14,800 ft. in the Cambrian. The previous record was the 2 Kvam in Williams County at 14,600 ft.

A Regional Glance

The biggest news outside the Rockies and the Pacific Northwest was in far Southwest Texas at a Magnolia Petroleum Co. wildcat in the Val Verde basin.

Magnolia-Western Natural Gas Co. 1 Brown-Bassett, a 15,000-ft. wildcat, blew out and burned. The fire is not the news, however. The Terrell County prospect is a long jump toward making the Val Verde basin a real producing province for Texas.

This basin is barely scratched. There are few fields, little production, and plenty of undrilled territory in a basin that has no definite limits.

The Magnolia-Western Natural wildcat flowed gas and distillate from the Devonian, an entirely new pay for the area. Other production in the area is from Pennsylvanian, Permian, and Cambro-Ordovician (Ellenburger).

Although the blowout made big news on the oil pages, the real news is yet to come. This significant wildcat should spark a much-needed push into this almost asleep future petroleum province.

Other Texas happenings . . . An important oil discovery was completed in

Breakdown of Wildcats Drilled in July 1957, by Depth

	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama																			1	2		1					
Arkansas																			3	1	8	3		2		1	
California		2			1	1								1	1				2	7	8	9	7	6	2		
Colorado				2	2	1							1	2					2	1		16	17	2			
Florida																										1	
Illinois			1																13	23	22						
Indiana																			1	3							
Kansas		1	1	4										1					1	13	19	25	7				
Kentucky											1								12	6	5						
Louisiana			1				4	3									2	2		4	4	3	6	7	9	4	2
North			1																	4	4	3	6	2			
South							3	3									1	2						3	7	4	2
Offshore							1										1							2	2		
Michigan			1	1																2	4	1					
Mississippi				1	1			1														1	9		1	1	1
Montana				1															1		4	3	2	1	1		
Nebraska					3																2	12	37				
New Mexico					3		1	1					1						1	3	4	3	1		1		
Northwest					3															1	2		1				
Southeast							1	1					1						1	2	2	3			1		
New York																						3					
North Dakota																			1		4	3		2			
Ohio													1									1					
Oklahoma	1		2		1	1								1	2	1	1		4	4	4	7	11	1	1		
Oregon																								1			
Pennsylvania																							1				
South Dakota																			2	1	1						
Texas	1	3	6	4	10	4	3							1	1		1		28	117	65	66	75	42	9	5	
Dist. 1	1		1														1		4	17	5	3	2	1	1		
Dist. 2						2															4	5	5	11			
Dist. 3					1	1									1								6	23	1		
Dist. 4		1	1				1												4	2	5	3	10	1	3		
East					1														3	4	2	7	14	1			
Dist. 7-B		1	2	2	1									1					6	28	22	12	8				
West			1	1	4	1	2												3	5	9	13	15	5	3	5	
Dist. 9		1	1	1	3														8	56	14	21	13				
Dist. 10																				5	4	2	2		1		
Utah					1						1			1					2	2			4				
Washington																						1					
West Virginia														1									1				
Wyoming	1		1		2								1	1					1	6	2	5	5		1		
Total U. S.	3	6	13	13	24	7	8	5		2	3	3	10	2	2	2	2		75	195	156	163	183	64	25	12	3
Western Canada		2	4	7	2	2				1	2	1	4	3	1					5	15	22	16	3	1		
Alberta			2	1	2	2					1	1	1		1					3	9	4	12	3	1		
Saskatchewan		1	2	6						1	1									1	3	17	2				
Manitoba		1																		1	3	1					
British Columbia													3	3									2				

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

Breakdown of Field Wells Drilled in July 1957, by Depth

	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama							4																				
Arkansas	1	47	14	5	2									1						2	15	9	1				
California	14	36	19	13	7	8	9	2				1		3					4	1	1	3	2				
Colorado				2	3	1				1		2		7						1		5	3				
Illinois	6	23	34	2							1								2	17	45						
Indiana	5	7	1																4	12	5						
Kansas		21	73	32	3						1	19	9	7					1	5	58	29	3				
Kentucky	26	11	1								1	7	4						20	14	5						
Louisiana	3	36	12	7	20	35	28	11			7				8	3	5	3		4	13	10	15	19	9	1	2
North	2	35	10	4	6	4	2				7				2					4	12	7	8	3			
South	1	1	2	3	9	13	23	11							4	3	3	3				3	4	10	6	1	1
Offshore					5	18	3								2		2				1		3	6	3		1
Michigan		7	6		4							6	1						1	4	1	1	1				
Mississippi					2	1	1															1	3	1	2		
Montana		2	7	2	2	6									1					2	1	1					
Nebraska					29							1									2	1	10				
New Mexico	1	12	15	22	15	3	10	1			8	19	6	20	1				2	2	5	3	1	1		1	
Northwest	1	5	1	1	12						8	18	5	20						2			1				
Southeast		7	14	21	3	3	10	1				1	1		1				2		5	3		1		1	
New York	17																		18		1						
North Dakota						10																		1			
Ohio	25	1	13							7	4	2							12	8	4						
Oklahoma	26	65	60	30	29	9		1		1		3	3	13	2				21	48	46	14	12	3			
Pennsylvania	5	8								1	1	3		11						7	6		4				
Texas	73	183	329	163	192	70	26	12			6	5	3	16	1	2			18	97	52	59	54	18	5		
Dist. 1	7	15	20		1	1													2	10	4		2				
Dist. 2	4			1	10	9	1							7						2		4	3	4			
Dist. 3	3	4	6	9	22	12	5												2	3	6	6	6	7	2		
Dist. 4	4	8	10	4	11	4	1	1			1	1		1					3	1	6	5	9	2			
East	8	12	6	9	16	5														1	2	3	9	1			
Dist. 7-B	12	34	22	25	17								1	1					4	21	11	15	6				
West	2	32	161	79	79	32	17	11						2		1			1	5	5	11	10	3	2		
Dist. 9	33	75	21	36	29								1	4					6	53	16	14	9				
Dist. 10		3	83		7	7	2				5	4	1	1	1	1				1	2	1		1	1		
Utah					4																		5				
Virginia													3	6								1					
West Virginia	1	1									23	8	7						1	2	3						
Wyoming			5	5	4	2	1					1		1					4	2	9	3	4	1			
Total U. S.	203	460	589	283	316	145	79	27		10	52	77	36	85	13	5	5	3	108	228	272	140	118	44	16	2	2
Western Canada		23	12	118	32	11						4	5	1	2					8	2	11	1				
Alberta		6	5	24	32	11						4	3	1	1					2		3	1				
Saskatchewan		1	4	93																	2	7					
Manitoba		16	3																	6							
British Columbia				1									2		1							1					

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

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Footage Breakdown for July 1957

	Fields			Wildcats		
	Oil	Gas	Dry	Oil	Gas	Dry
Alabama	45,431					8,717
Arkansas	175,363	5,123	95,443			71,391
California	427,605	21,600	34,180	17,777	15,486	195,500
Colorado	34,300	46,719	42,305	30,243	17,866	189,432
Florida						12,748
Illinois	152,956	1,653	169,632	3,025		120,224
Indiana	22,209		37,508			5,085
Kansas	429,090	137,076	342,243	23,170	5,220	237,677
Kentucky	44,183	40,530	52,890		1,795	31,567
Louisiana	1,050,675	230,077	471,071	87,947	58,403	309,263
North	236,433	31,363	112,610	3,160		81,503
South	604,645	155,134	233,426	73,662	44,520	188,585
Offshore	217,597	42,580	125,035	11,125	13,883	39,175
Michigan	51,125	20,037	21,019	6,478		20,262
Mississippi	29,865		52,531	25,531		98,914
Montana	105,455	7,623	9,796	4,222		61,804
Nebraska	179,370	3,336	73,032	19,481		284,787
New Mexico	395,469	232,849	62,279	43,402	2,743	49,507
Northwest	79,831	215,697	9,084	17,801		14,127
Southeast	315,638	17,152	53,195	25,601	2,743	35,380
New York	17,000		21,732			13,790
North Dakota	86,987		8,354			45,261
Ohio	66,543	21,807	63,018		3,521	3,800
Oklahoma	741,879	130,324	404,204	20,846	39,967	137,086
Oregon						8,726
Pennsylvania	22,780	98,265	45,149			5,511
South Dakota						6,359
Texas	4,419,310	170,716	1,151,053	172,493	21,929	1,717,136
Dist. 1	101,619		41,671	4,150	10,628	94,995
Dist. 2	156,080	41,361	69,862	17,993		152,885
Dist. 3	365,537		168,821	13,130	7,310	245,927
Dist. 4	198,071	10,255	113,927	16,960		138,441
East	227,443		87,346	5,288		132,382
Dist. 7-B	368,117	9,534	177,856	24,434	3,991	233,662
West	2,050,574	22,959	177,854	62,197		332,325
Dist. 9	561,877	27,995	282,096	28,341		330,886
Dist. 10	389,992	58,612	31,620			55,633
Utah	22,830		28,938	6,345	6,867	30,057
Virginia		46,542	4,970			
Washington						4,326
West Virginia	2,049	99,817	13,097		6,730	7,391
Wyoming	90,640	9,845	79,390	17,823	10,304	91,675
Total U. S.	8,621,114	1,323,939	3,283,834	478,783	190,831	3,767,996
Western Canada	896,345	58,415	76,212	80,717	75,547	293,031
Alberta	413,960	49,768	22,892	42,852	24,488	165,151
Saskatchewan	436,200		36,919	35,707	5,551	98,883
Manitoba	42,165		12,176	2,158		15,096
British Columbia	4,020	16,647	4,225		45,508	13,901

Andrews County, and a new depth record was set for the State of Texas.

. . . Continental Oil Co. 1 T. F. Teague, West Texas Wolfcamp discovery, flowed at the rate of 1,345 bbl. of oil per day on ½-in. choke. Nearest production is about 2 miles south.

. . . A new drilling depth record for Texas was set at Pan American 1 University CS, Pecos County wildcat. The wildcat went to 19,078 ft., breaking the old record of 19,060 ft. held by Magnolia at West Ranch field in Jackson County.

EXPLORATION THIS WEEK

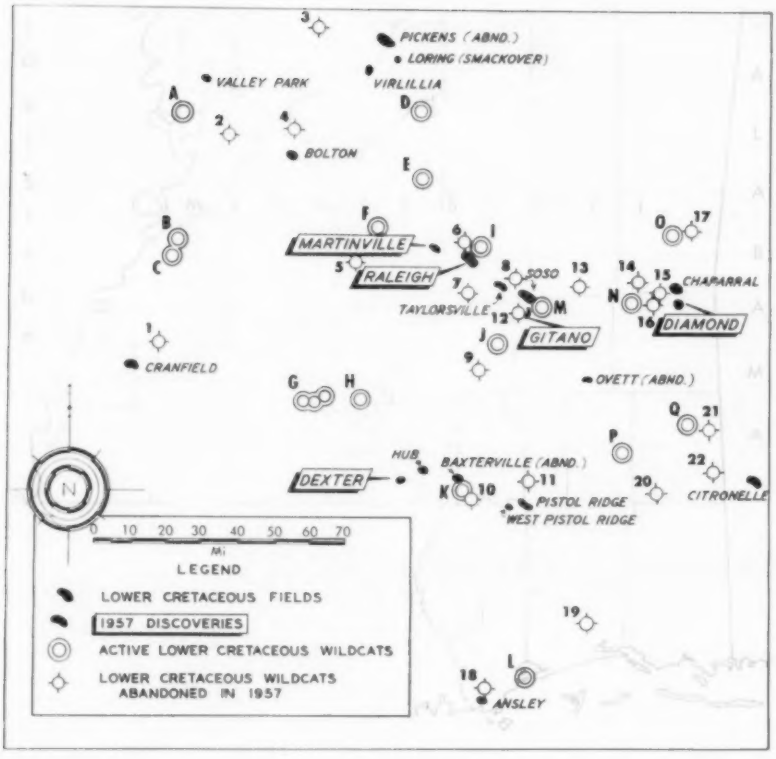
Appalachian	**168**
California	**169**
Canada	**170**
Illinois Basin	**172**
Louisiana	**172**
Texas	**173**
Michigan	**175**
Nevada	**175**
Oklahoma	**176**
Rocky Mountains	**176**
Successful Wildcats	**177**

Oklahoma bits . . . The Sooner State's deepest well neared the 3½-mile mark in July, and is now below 19,015 ft. on its way to 20,000 ft. The well is Magnolia 1 Sterba-Ordovician in the ultra-deep Caddo County area of southwestern Oklahoma. Geologists are not quite sure where they are in the section, but they think it's probably Mississippian. At any rate, the well is down farther than anything else in the Anadarko basin's long drilling history. The objective of the well is the Ordovician sands, prime target for Oklahoma drillers.

. . . Harper County. The growing southeastward movement of Harper County production added another big one. Midwest Oil Corp. et al. 1 Cooper, 8 miles from nearest production, flowed 25,000 M.c.f. of gas per day from Chester-Mississippian to open a rank new gas area in this county.

Lower Cretaceous Score in Mississippi:

75 per cent of all wildcats
50 per cent of all field wells



. . . with total already ahead of entire 1956

By Neil Williams

A SURVEY of South Mississippi's active Lower Cretaceous exploration lists 19 wildcats now drilling and 27 others already having been completed so far this year.

Drilling to Lower Cretaceous or deeper formations, in known fields also accounts for 19 currently active operations with nearly 30 other wells completed already this year.

This grand total of more than 95 wells, drilled or drilling, to Lower Cretaceous depths this year exceeds by more than 15 the number of such wells completed during all the preceding year.

Lower Cretaceous exploration now accounts for more than 75 per cent of all wildcats and more than 50 per cent of all field wells now drilling in the state.

Five of this year's already completed Lower Cretaceous wildcats have opened new fields, boosting to 19 the number of South Mississippi fields in which

SOUTH MISSISSIPPI'S Lower Cretaceous development showing fields discovered, and 1957's wildcat drilling. Active wildcats (letters) and completed tests (numbers) are listed in tables below.

ACTIVE DEEP WILDCATS IN SOUTH MISSISSIPPI

Map key	Company, well name	County	Permit depth (ft.)
(A)	Launius-Meyer 1 Kelsey-Hayes	Issaquena	10,000
(B)	Midstates Oil Corp. 1 Headley	Claiborne	9,900
(C)	Sun Oil Co. 1D Supervisors	Claiborne	11,900
(D)	Carter Oil Co. 1 Kersh	Rankin	13,900
(E)	C. F. Martin 1 Ragsdale	Rankin	11,100
(F)	Carter Oil Co. 1 Laughlin	Rankin	12,900
(G)	C. F. Martin, Inc., 1 McCaffery*	Lincoln	11,000
	Shell Oil Co. 2 Denkmann*	Lincoln	11,000
	Shell Oil Co. 1-A Hodges*	Lincoln	11,025
(H)	Humble Oil & Refining Co. 1 Sistrunk	Lawrence	13,500
(I)	Paul Burdick 1 Strahan	Smith	13,000
(J)	Zach Brooks Drilling Co. 1 Welsh	Covington	13,750
(K)	Jett Drilling Co., Inc., 1-A Phoenix	Lamar	9,500
(L)	J. Willis Hughes 2 State	Hancock	11,000
(M)	Sinclair Oil & Gas Co. 1 Murray	Jones	13,300
(N)	Gulf Oil Corp. 1 Green†	Wayne	
(O)	Phillips Petroleum Co. 1-B Ivy	Clarke	11,000
(P)	Gulf Oil Corp.-Seaboard 1 Lott	Perry	14,500
(Q)	Sinclair Oil & Gas Co. 1 Robinson	Greene	13,900

*Lower Cretaceous tests in Sweetwater-Tuscaloosa field; †extension of Raleigh field; ‡deep test in Eucutta-Eutaw field—OTD 5,722 ft.

1957 SOUTH MISSISSIPPI UNSUCCESSFUL LOWER CRETACEOUS WILDCATS

Map No.	Company, well	County	Total depth (ft.)
(1)	Jett Drilling Co. 1 Geohegan-Groome	Jefferson	10,787
(2)	California Co. 1 Anderson	Warren	12,569
(3)	Carter Oil Co. 1 Fouche	Yazoo	13,391
(4)	Larco Drilling Co. 1 Bardin-Riley* (1)	Hinds	10,508
(5)	Central Oil Co.-Jett 1 Gaylord	Simpson	13,505
(6)	California Co. 1 Central "7"	Smith	13,025
(7)	Continental Oil Co. 1 Bryant	Smith	13,577
(8)	Gulf Coast D. & E. Co. 1 Eaton	Smith	12,309
(9)	Sinclair Oil & Gas Co. 1 Miller-Autman	Covington	15,711
(10)	Jett Drilling Co. 1 Phoenix	Lamar	9,501
(11)	John Neilson 1 Anderson	Forrest	9,111
(12)	Pan Amer. Petroleum Corp. 1 Easterling	Jones	13,100
(13)	Gulf Coast D. & E. Co. 1 Jasper	Jasper	10,517
(14)	Larco Drilling Co. 1 Toney Edwards	Clarke	9,722
(15)	Central Oil Co. 1 Graham-McCoy	Wayne	10,085
(16)	Ralph Stanley 1 G. G. Stanley Est.†	Wayne	10,740
(17)	Porter Johnson 1 International	Clarke	7,008
(18)	J. Willis Hughes 1 State-Mulatto‡	Hancock	10,949
(19)	Texas Crude Oil Co. 1 Elmendorf§	Harrison	12,012
(20)	Southern Natural Gas Co. 1 McKay	Greene	10,600
(21)	California Co. 1 Calco et al	Greene	13,500
(22)	Humble Oil & Refining Co. 1-B Davis	Greene	12,513

*Old hole deepened from 6,512 ft. †Deep test in Yellow Creek field. ‡Old hole drilled deeper. §Old hole deepened from 9,505 ft.

SOUTH MISSISSIPPI LOWER CRETACEOUS FIELDS*

Field and county—	Discovery year	Producing zone	Depth	Type prod.	Wells comp.†	Wells drlg.
Hub, Marion	1946	Dantzler	10,100	Gas	‡1	0
Cranfield, Adams	1946	Paluxy	11,600	Gas	‡1	0
Ovett, Jones	1948	Glen Rose	12,000	Oil	§1	0
Pickens, Yazoo	1950	Travis Peak	7,700	Oil	¶1	0
Virlillia, Madison	1951	Hosston	10,500	Oil	2	0
Chaparral, Wayne	1952	Rodessa	8,900	Oil	14	0
			9,600	Oil		
Baxterville, Lamar	1952	Wash.-Fred.	10,800	Oil	¶1	0
Soso, Jones-Jasper-Smith	1953	Paluxy	9,750	Gas		
		Rodessa	11,500	Oil	90	3
		Bailey	12,000	Oil		
Bolton, Hinds	1954	Paluxy	9,900	Oil		
		Mooringsport	10,200	Oil	36	3
		Rodessa	10,700	Oil		
Pistol Ridge, Pearl River	1955	Dantzler	9,400	Oil-Gas	21	5
		Wash.-Fred.	10,000	Oil-Gas		
Ansley, Hancock	1955	Wash.-Fred.	10,800	Gas-Cond.	5	1
Taylorsville, Smith	1956	Rodessa	10,500	Oil	1	0
West Pistol Ridge, Pearl River	1956	Dantzler	9,960	Gas-Cond.	2	1
Valley Park, Issaquena	1956	Mooringsport	6,260	Oil	1	1
Raleigh, Smith	1957	Bailey	11,700	Oil	2	1
		Hosston	12,200	Oil		
Martinville, Simpson	1957	Bailey	12,400	Oil	2	1
Gitano, Jones	1957	Paluxy	11,280	Oil	1	1
Diamond, Wayne	1957	Hosston	9,900	Oil	2	2
Dexter, Walthall	1957	Paluxy	13,500	Gas	1	0

*Excludes Loring field in Madison County with two Smackover gas-condensate wells. †Includes dry holes. ‡Shut in since completion. §Discovery well recompleted in Eutaw sand. ¶Abandoned.

production has been found in sands of that age.

Although first Lower Cretaceous production in South Mississippi was found as early as 1946, it has been only within the last 5 years that any sizable exploration has been undertaken or any widespread interest directed to it. Prior to this period, few tests were carried below the top of the Lower Cretaceous. Deepest major development concerned only the Upper Cretaceous-Tuscaloosa section. Tertiary-Wilcox sands got a big play in southwestern Mississippi several years ago, but until lately principal production has been from Tuscaloosa and Eutaw sands.

Soso, discovered in August 1953, still is the most important Lower Cretaceous field in the state, and actually the only one of major size, either in area or productivity. Extending into three counties, this field has accounted for the drilling of more than 90 wells with about 85 now producible. During the peak of its development in the fore part of 1956, it had more than 15 rigs running.

Bolton, however, is a good second to Soso with more than 35 wells drilled and more than 30 now producible. It is a 1954 discovery in Hinds County, where it made, at that time, a 75-mile jump northwest along the trend of Lower Cretaceous fields. There it gave another big boost to Lower Cretaceous thinking.

None of this year's discoveries has received enough development to give any picture of its importance. Three of these discoveries were made in fairly rapid order during the first 2 months of the year. This proved a prime incentive for this year's stepup and spread of deeper drilling.

On the basis of only two wells completed, Raleigh, 1957's initial discovery, may have the earmarks of an important field. Both wells, one completed in the Bailey zone, and the other in the deeper Hosston section, made prolific potential flows. Also, the discovery well at Martinville, this year's second field, showed up good on its tests, but its offset has proved dry.

Discovery of another Lower Cretaceous field is indicated by showings encountered by one of the currently active deep wildcats (J on map) being drilled by Zach Brooks Drilling Co. in eastern Covington County. Showings are in the Glen Rose section, now being tested with casing perforated at 12,671-77 ft. A drill-stem test of this pay recovered 600 ft. of 18.7°-gravity oil with about 460 ft. of water. Attempts to complete this well as a producer have been delayed by mechanical difficulties. Hole was drilled to 14,715 ft.

Largest concentration of Lower Cretaceous development now is in the Pistol Ridge area, on the Pearl River-Forrest County line. There various sands in the Dantzler and Washita-Fredericksburg zones are being explored with five rigs currently active. Those sands, productive of oil, gas, and gas-condensate, range from about 9,000 ft. to below 10,000 ft. in depth. **End.**

EXPLORATION HIGHLIGHTS

APPALACHIAN

OHIO

Two Wildcats Find Production in Ohio

Two wildcats, both by the same operator, Busk & Waters, found production in widely separated areas.

Its 1 Sunnyhill Coal & Lewis, Section 22, Pike Township, Perry County, logged Clinton sand at 3,459-86 ft. with 22 bbl. natural. After fracture the well has been restricted to flow 100 bbl. per day.

- In Bedford Township, Coshocton County, their 1 Burl Walters, Section 13, found the Clinton at 3,334-84 ft. with 150,000 cu. ft. gas and a show of oil natural and 400,000 cu. ft. gas and 15 bbl. oil in 24 hours after fracture.

- In Franklin Township, Wayne County, Burtner, Morgan & Stevens 1 Kate Hoy, Section 10, previously reported as indicating a ⅔-mile north extension, made 120 bbl. in a 24-hour test after fracture.

PENNSYLVANIA

Gas Flow Reported At Keck Wildcat

Peoples Natural Gas Co. 4089 M. I. Keck, Mount Pleasant Township wildcat in Westmoreland County, southwestern Pennsylvania, gaged 11,365 M.c.f. of gas per day at 7,485 ft. Total depth is 7,565 ft.

Large Well Reported In Kiskiminetas

In Kiskiminetas Township, Armstrong County, Mid East Oil Co. 1 Heckman struck a large pocket of gas testing 10,900 M.c.f. in the Speechley sand. Total depth is 2,763 ft. Several wells have been drilled in this area to and through this formation, but this is the largest well reported in recent years.

WEST VIRGINIA

Two New Deep Tests Get Under Way in State

Two new deep wildcats are under way in West Virginia. One is in Ken-

tucky district, Nicholas County. It is the Rotary Development Corp. 1-A New Gauley Coal Corp. Drilling is at 6,115 ft. Location of this well is on the Richwood Quadrangle, 4.88 miles south of latitude 38 degrees 15 minutes and 3.42 miles west of longitude 80 degrees 35 minutes.

In Cabin Creek district, Kanawha County, Pure Oil Co. 372-497 Williams Coal Co. is drilling at 6,019 ft. Location of this rank wildcat is on the Peytona Quadrangle 4.82 miles south of latitude 38 degrees 10 minutes and 0.62 mile west of longitude 81 degrees 30 minutes.

CALIFORNIA

Santa Fe Drilling Hits New Fruitvale Pay

Santa Fe Drilling Co., operator, tapped a new fault block pay on the east flank of the South Fruitvale field in Kern County. Santa Fe, in the joint test with Great Basins Petroleum Co., found the Parker sand productive at 3,317-3,355 ft. The test, 64-A-26 KCL, has been put on the pump for 25 to 30 bbl. net daily of 17°-gravity oil.

Union Scores Big With Mountain View Extension

Union Oil Co. has apparently continued its successful record in the Mountain View field of Kern County with a report that its first extension test of its Houchin-Guimarra discovery tested for a rate of 2,040 bbl. daily of 29.9°-gravity crude. This is considerably better than the discovery which was completed last April for around 160 bbl. daily. The two wells are a half mile apart in 27-31s-29e, about 1 mile southeast of the small community of Arvin.

This latest Union completion in the Mountain View area, 53-27 Union-Hancock-Houchin-Guimarra, has 81 ft. of zone at 8,179-8,260 ft. Total depth is 9,027 ft.

Two Finds at Mount Poso

Activity in the Dominion area of Mount Poso has been sparked by two recent discoveries.

The better of the two appears to be Steele Petroleum Co.'s new fault block discovery midway between the Dominion pool and the main Mount Poso field area in SW NE 29-26s-28e. The well, 2 Jones, was completed on the pump for 84 bbl. daily of 14°-gravity crude from a total depth of 1,713 ft.

A little over 1 mile northeast of 2 Jones, Intex Oil Co. brought in an extension test of the Dominion pool for 10 bbl. daily of 14°-gravity crude from an interval at 1,436-52 ft. The water cut was 62 per cent. It is located ½ mile southeast of Intex's other production from the Dominion pool.

Standard Completing Kettleman Hills Test

Standard Oil Co. was running liner in the 11,640-ft. 331-20J on the east flank of the Kettleman North Dome field in Fresno County. This well is a followup to Standard's 342-20J in the same area. On a formation test of the interval 11,365-11,640 ft., the new well recovered 7,450 ft. of clean, gassy 27.8°-gravity crude.

Wilmington Extended

Already one of the largest in the state, the huge Wilmington field in the Long Beach-Los Angeles Harbor area was extended again recently. Paul F. McKenzie did the job with E-25 Well in the west flank of the field in 31-4s-13w. Put on the pump, the new extension was making an estimated 50 bbl. daily of 14°-gravity crude from an interval at 3,757-3,862 ft. Total depth is 3,950 ft.

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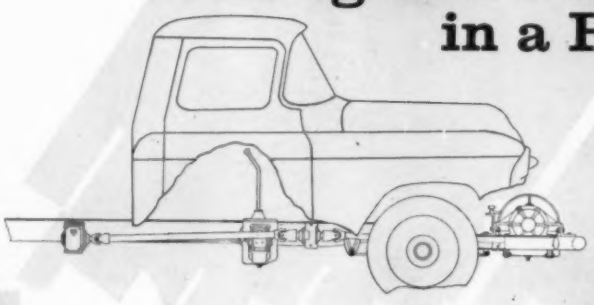

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Mountain View Extension

McCulloch Oil Exploration Co. of California was preparing to complete what looks like a good extension test of the Mountain View field on the west flank of the DiGorgio area in Kern County. The operator reported swabbing clean oil for 2 hours at a 150 bbl. daily rate after acidizing the interval at 6,030-6,208 ft.

Fourth Well in New Gatchell Pool

Union Oil Co. put 55-34 Well on the pump for 154 bbl. daily to make it the fourth completion in the recently discovered deep Gatchell sand pool in the Guijarral Hills field in Fresno County. Union's new completion is located two locations south of L. A. Harnish's new pool discovery well, 53-34 Allison. Union reports tapping the Gatchell sand at 10,238-10,335 ft. Total depth is 10,391 ft.

CANADA

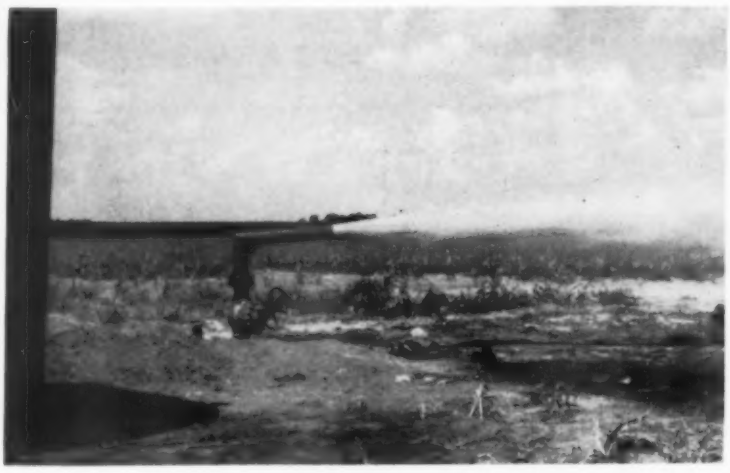
Alberta and B.C. Add New Discoveries

Another three exploratory wells in Alberta and British Columbia were added to the year's discovery rate during the past week. Two of those tests found new accumulations of gas while the other indicated the discovery of oil. Both of the gas strikes were recorded within Alberta's boundaries while the oil find was made in the northeastern sector of British Columbia. Canadian Husky Oil, Ltd., operated one of the new gas finds and that well, which lies in the general Hilliard area, flowed gas at indicated commercial rates from three separate horizons. The other gas discovery during the period was recorded by Fargo Oils, Ltd., and was the last of a five-well exploratory drilling program in the Acadia Valley area in the southeastern sector of the province. British Columbia's newest oil strike was chalked up by Pacific Petroleums, Ltd., and is in the Buick Creek sector, 40 miles northwest of Fort St. John townsite.

As well as the exploratory successes reported during the week, Jefferson Lake Sulphur Co. reported the first official information gained from the drilling of two test wells in the Calgary area of Alberta. One of those tests rated an absolute open flow potential of 123,000,000 cu. ft. daily as well as rendering 20 bbl. of condensate per million cubic feet of gas; while the other, 6 miles south of the large gasser was completed in a different zone, but also gave a large gas flow rate of 7,000,000 cu. ft. daily which contained a 37 per cent hydrogen sulfide content.

● The Husky operated venture, is being drilled with Bailey Selburn Oil & Gas, Ltd., and is known as, Husky-Baysel 1 Pinedale. It lies on LSD 1, 13-54-17w4, 5 miles north-northwest of Mundare townsite, 40 miles northeast of Edmonton and is 28 miles southeast of D3 oil production in Redwater field. After discovering gas in the Viking formation, which rated 2,600,000 cu. ft. per day, gas flows of 515,000 cu. ft. daily and 1,664,000 cu. ft. daily were tested from the Blairmore and Cretaceous sectors respectively. Production casing has now been set on this well because of circulatory problems which increase the possibility of an unwantd blowout. Upon completion of that operation crew continued making hole in an effort to fully evaluate the Devonian structure that is running 125 ft. high to prognosis, a very favorable and sometime indictive feature.

● The Fargo discovery, meanwhile, Fargo-H.B. 9-13-26-2 Acadia Valley, was drilled on LSD 9, 13-26-2w4, on acreage acquired under farmout agreement from Hudson's Bay Oil & Gas Co., Ltd. It lies 160 miles east of Calgary in close proximity to the Sibbald gas area which will be tied into the export plans of Trans Canada Pipeline during 1958. Discovery was indicated



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when drill-stem test in the Viking horizon, which was topped around the 2,540-ft. level, flowed the product at a rate estimated between three and five million cubic feet per day.

● The team of Pacific Petroleums, Ltd., Canadian Atlantic Oil Co., Ltd., Peace River Natural Gas Co. and Sunray Oil Corp., announced that its well, 15 Buick Creek in unsurveyed territory, British Columbia, had indicated crude oil success (the second in the area in about 1 month) when drill-stem test in the Nikinassin formation gave a pipe recovery of 2,400 ft. of gas-cut sour oil and 24 ft. of gas-cut oil-cut mud, from the 3,900-ft. level. The initial oil strike in this area was in the same formation and lies 5 miles south of it. Both of the wells were drilled on acreage acquired under farmout agreement from Canada Southern Petroleums, Ltd., Canso Oil Producers and Catawba Corp.

● The large gas discovery in the Calgary area, Jefferson Lake-C.P.R. 27-6, North Calgary, was drilled on LSD 6, 27-25-29w4, was drilled to a total depth of 8,915 ft. and encountered a prolific productive formation in the Mississippian-Elkton and encountered Devonian - Crossfield formation which was also gas bearing and which also contained a high hydrogen-sulfide content. Core analysis and tests for recoverable gas reserves, based on this well estimate 30 billion cubic feet per section of 640 acres.

The other Jefferson Lake well, C.P.R. 27-11 Calgary, was drilled on LSD 11, 27-24-29w4, 6 miles south of the other test and the open flow potential of highly sulfurous gas at rate 7,000,000 cu. ft. daily was obtained from the Devonian-Crossfield structure.

SASKATCHEWAN

Mississippian Discovery Reported at Adelaide

Another Saskatchewan discovery rounded out the week's exploratory news when Canadian Oil Companies, Ltd., announced that a well which it drilled with Devon Palmer Oils, Ltd., in the southeastern sector of the province had given very encouraging results during drill-stem test operations. This strke, Whte Rose-Devon Palmer-Canadian Superior 16-3 Adelaide, on LSD 16, 3-10-1w2, is on acreage acquired under farmout agreement from Canadian Superior Oil of California and indicated its discovery in the Mission Canyon zone of the Mississippian horizon when a pipe recovery of 1,870 ft. of gassy clean oil was made upon completion of a test evaluation.

The venture lies 25 miles north of oil production in Alida oil field and following the successful test was carried to completion depth and production casing was set in preparation for further production tests.

QUEBEC

Batiscan Well Drilling in Potsdam

At Bald Mountain 2 Batiscan, 1,250 ft. southeast of the discovery well, drilling is proceeding below 3,007 ft., 277 ft. in the Potsdam formation, which is believed to be about 300 ft. thick, and to immediately overlie igneous, or basement rock.

The Potsdam, made up of alternate soft and hard bands of sandstone, holds possibilities down to its bottom foot of thickness and with the well completed in a few days, either as a producer or otherwise, the drill rig will immediately be moved to within 25 ft. of 1 Louiseville, 38 miles southwest of the discovery well, where the diamond drill at 819 ft. penetrated, with a 1½-in. core, a gas zone which officially tested 847,000 cu. ft. per day, and which the limitations of the diamond drill prevented from completing as a commercial producer.

The drill rig should be moved and set up at the Louiseville location in

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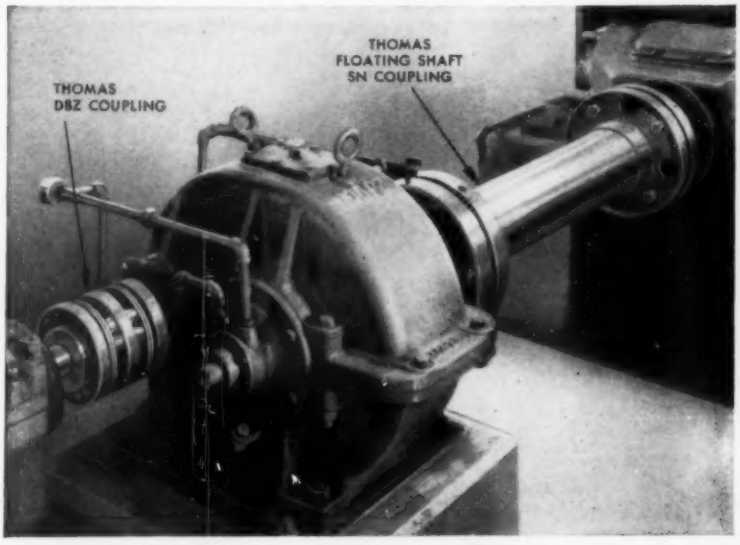

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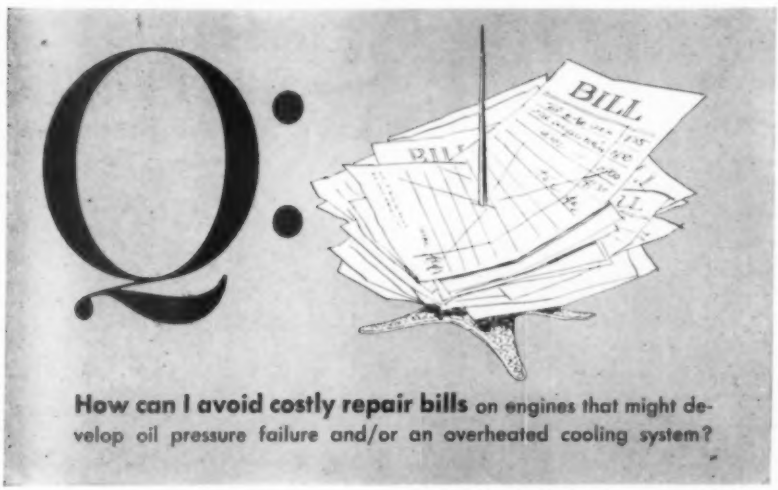
about a week and the drilling to the gas zone accomplished in about 10 days.

● At Bald Mountain 3 Batiscan, ½ mile northwest of the discovery well, a loose sand was encountered at 2,957 ft., which in recent days has made further penetration impossible, and it is felt that the 90 odd feet of Potsdam formation yet to be penetrated there, can best and more quickly be effected at a later date with the new, oversize, 60-ft. derrick, 4,500 ft. rated capacity, diamond drill recently installed at 1 St. Roch.

The McMaster drill rig at 3 Batiscan will now promptly be moved to drill 4 Batiscan, 1,000 ft. northeast of the discovery well, and the moving should be effected in 4 or 5 days and the drilling to the gas zone encountered at 2,197 ft. effected in about 3 weeks.

With Batiscan 2 and 3 wells in a near state of negative completion and drilled in line east and west on both sides of the discovery well, Bald Mountain Oil Co. now believes that the gas field penetrated at 2,197 ft. by 1 Batiscan, and which officially tested 3,500,000 cu. ft. per day, lies ahead to the north-northeast, extending south to a point, or nose, to include the discovery well.



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Two New Oil Pools in Illinois in July

Two new oil pools, Chesterville East in Douglas County and Exchange West in Marion County, were discovered in July according to the Illinois Geological Survey Division of the Department of Registration and Education.

Chesterville East pool appears to be the best discovery thus far this year. This pool is located in Douglas County approximately 1¾ miles southeast of Chesterville and about 1½ miles west of Arcola. The discovery well, on the S. L. Munson farm, had an initial production of 787 bbl. per day from the Rosiclare sand. By the end of the month three additional oil wells were completed, all of which flowed oil but were choked down to produce 150 bbl. of oil per day.

The low level of drilling which has marked the oil industry this year continued in July. Completions for the month totalled 223. In July a year ago 365 wells were completed. Of the 223 wells completed in July, 81 were oil wells and the rest dry holes.

Crude-oil production in Illinois continued to experience a temporary curtailment because of a refinery strike in Ohio. The estimated production for July is 4,892,000 bbl., more than 2,000,000 bbl. less than for July of last year. However, Sohio Petroleum has been able to find an outlet for a small quantity of crude, and therefore Sohio Pipe Line, which transports over 25 per cent of the oil produced in Illinois, has been authorized to run a limited quantity of oil from leases to which continued shut-down might cause damage or undue hardship. This should reflect an increased production in August, although probably still below normal until the strike is settled.

LOUISIANA

NORTH LOUISIANA

Old Zwolle Field Comes Back to Life With Five Wells

Sabine Parish's old Zwolle field in west-central Louisiana is enjoying a successful revival. There are five wells drilling in this field with three nearing completion. Two other wells have been located.

Major Oil Co. 1 Sabine Lumber Co. NE¼ 25-8n-12w, is the newest well in this play. The well will go to the chalk at 2,300 ft.

Frank E. Anderson will drill a deep wildcat inside the field at 2 Bauer & Barthold in SW¼ 25-8n-12w, going to 6,000 ft. to the Rodessa. Other wells drilling in Zwolle are: 1 Bauer & Barthold in 25-8n-22w, drilling at 2,442 ft.; J. W. Alsobrook and C. G. Buettner 1 Dick Sliman in SW NE 30-8n-11w, drilling at 2,464 ft.

TEXAS

EAST TEXAS

Travis Peak Wildcat Drilling in Hopkins

While Hopkins County gained a Travis Peak wildcat, Anderson and Cherokee counties had sub-Clarksville discovery prospects near completion stages.

The deep test is Robert F. Roberts, Tyler independent, 1 Maggie E. Dry. Location is on a 137-acre tract in the Thomas Lee Survey, Abstract 550, which is 9 miles southwest of Sulphur Springs and 2 miles northwest of Arbala, in southwestern Hopkins County. The project was scheduled to 8,700 ft., or 300 ft. into the Travis Peak formation. Pyburn Drilling Co. has contract.

Cherokee County . . . H. L. Gist, Jr., T. J. Johnson and Jim Gulley, all of Tyler, were waiting on cement after perforating the sub-Clarksville at 4,644½-46½ ft. at 1 Crysup & Haberle, wildcat 3½ miles northwest of Jacksonville.

A drill-stem test at 4,636-50 ft. was cut short after 5 minutes due to mechanical troubles. Recovery was 725 ft. of oil and gas-cut mud. Another test, at 4,631-57 ft. produced a small blow of gas and recovered 200 ft. of oil and gas-cut mud in 15 minutes. Operators drilled ahead to 4,908 ft. and ran electrical surveys.

Good shows and some oil recovery were reported at H. L. Gist et al 1 Crysup & Haberle, Cherokee County wildcat northwest of Jacksonville.

The Slocum area of Anderson County has a sub-Clarksville prospect at F. B. Jackson 1 McMahn, northwest of Salmon.

Anderson County . . . Operators were reported running pipe for completion tests at F. B. Jackson, Jr. 1 W. M. McMahn, Ransom Rucker Survey, 2 miles northwest of Salmon. A test on the sub-Clarksville at 6,062-74 ft. was said to have had a hole full of oil. Further details were not disclosed.

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WEST TEXAS

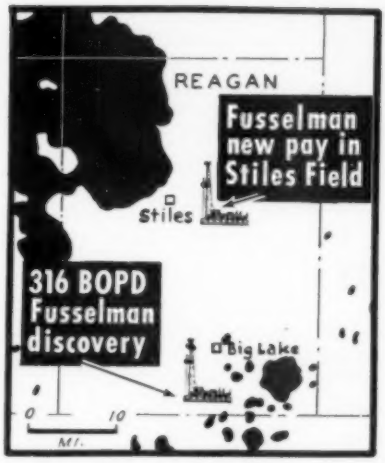
Reagan County Gets Two Fusselman Openers

Week's developments in Reagan County included the completion of two Fusselman strikes, one a pool discovery southwest of Big Lake and the other a new-pay discovery in Stiles (Ellenburger) field.

Ross Brunner et al 1-12 University, 5½ miles southwest of Big Lake, completed for a daily potential of 316 bbl. of 43°-gravity oil a day through 26/64-in. choke, from perforations at 9,411-19 and 9,424-40 ft. Top of pay was 9,411 ft. on elevation of 2,758 ft. Gas-oil ratio was 928:1 and tubing pressure 135 psi.

The Brunner test was drilled as an Ellenburger project, but tested salt water at 9,684-94 ft. Total depth was 9,805 ft. Location is on an 80-acre lease in Section 9, Block 12, University Lands Survey. Nearest Fusselman production is in Big Lake, South field.

Stiles (Ellenburger) field gained its Fusslman discovery at Phillips Petroleum Co. 7 Phillips-Southland Royalty-Zulette, in Section 10, Block C, GS&SF Survey. Location is 4 miles southeast of the town of Stiles in north-central Reagan County.



Two Reagan County openers: Ross Brunner 1-12 University, near Big Lake, and Phillips Petroleum's new pay at Stiles field.

Potential was 234.5 bbl. of 62.8°-gravity oil. through 12/64-in. choke. Perforations were at 10,330-40 ft. Gas-oil ratio was 5,990:1, with tubiing pressure at 1,150 psi. Top of pay was 10,294 ft. on evaluation of 2,571 ft. Total depth was 10,490 ft.

SOUTHWEST

"Dry" Wildcat Converted Into Oil-Discovery Well

An old dry hole 7 miles northeast of Alice, in Jim Wells County, is being converted into the discovery well of a new field.

It is a wildcat test drilled in 1952 by Head & Head to 5,512 ft. Hamon & Coates, who recently took over the test, cleaned out the hole, ran casing to 5,134 ft., and perforated at 5,052-55 ft.

Tested through ⅛-in. choke, the well flowed at the rate of 126.96 bbl. of oil per day with pressure of 770 psi. Gravity of the oil is 45.1°. Gas-oil ratio is 502 cu. ft. per bbl.

Location is in the Los Presenos de Arriba Grant about 1 mile southeast of Almond field, and about 2 miles northwest of Presenos field.

NORTH TEXAS

Jack County Deep Test Makes Shallow Find

North Texas is still good for shallow discoveries, and a good example is L. T. Burns Estate 3 Wright "C," located in the northwestern corner of Jack County. On completion test the well pumped 65 bbl. of 39°-gravity oil a day from pay at 810-20 ft.

However, operators drilled and tested to 4,099 ft., total depth, then plugged

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back to 880 ft. for completion. Location in the J. Robbins Survey, A-490 ft. is 1 mile east of 3,026-ft. production and ¼-mile northwest of pay around 1,035 ft. The new well is also 1 mile northwest of Antelope townsite.

Archer County . . . Star Oil Co. has been granted discovery status at its 1 B. Morbitzer, on the west side of Transcontinental 1 Caddo field. No. 1 Morbitzer drilled to 5,165 ft., entering Caddo pay at 5,159 ft. Potential was 127 bbl. of 41°-gravity oil a day, with gas-oil ratio of 400:1. Data presented before the Texas Railroad Commission showed two separate highs on the Caddo. The discovery was set up as Transcontinental, West field.

Taylor County . . . Ralston Oil Co. and LaGorce Oil Co. 1 Henry Sales, Jr., 3½ miles southwest of Tye, completed as a Dothan sand discovery at 1,955-57 ft., for 192 bbl. of oil a day. Gravity was not reported. Production was through 20/64-in. choke, under tubing pressure of 30 psi.

Mills County exploration . . . Byron Hoffman et al, San Angelo, have announced a 3,990-ft. Ellenburger wildcat for southeastern Mills County. The test will be 1 J. S. Owens, located on a 169-acre lease in the Hamilton County School Land Survey 1, 1½ miles east of Goldwaithe.

MICHIGAN

New Scipio Field Revived by New Drilling

New Scipio Trenton oil pool, Hillsdale County, was reactivated this week with the announcement of two new starts. One by discoverer Clifford A. Perry and the other by Aurora Gasoline Co. and McClure Oil Co.

Aurora and McClure spudded its 1 Stevens, SE SW NE 10-5s-3w, the diagonal southwest 20-acre offset to Perry's 1 Houseknecht discovery which was officially completed late last month after being under test and deepening for 6 months or more.

Perry was drilling below 1,540 ft. at the 1 Hornczi & Huraczy, NW NW SE 10-5s-3w, the diagonal southwest offset to Aurora and McClure's new start.

There are two producing wells in Scipio pool—the 1 Houseknecht discovery and the diagonal northwest 20-acre offset to the discovery which was drilled and completed by Aurora and McClure before the pool opener was officially completed. The discovery well, capable of flowing 400 bbl. of oil a day natural from Trenton pay at 3,891 ft., total depth, is restricted to about 180 bbl. a day. Its offset producer, an excellent Trenton flowing oil well but not as strong as the discovery, has been flowing an average of 120 bbl. of oil a day, restricted, since it was completed in May of this year.

At least part of the delay in starting new drilling in this area was the excessive cost required to prepare the Aurora and McClure location before a drilling rig could be moved in. Wellsite fell in the center of a 40-ft. deep swamp. Location preparation was reported to have cost approximately $15,000.

This new Trenton pool appears to offer promise of being one of Michigan's new development areas.

NEVADA

Standard Drilling Ahead at White River

Standard Oil Co. of California was redrilling 1 County Line Unit below 4,376 ft. This wildcat is in the White River Valley of White Pine County. Standard reports topping the volcanics at 1,485 ft.

● In Battle Mountain region of Lander County, activity was highlighted by

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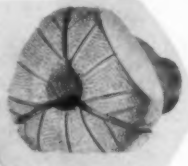

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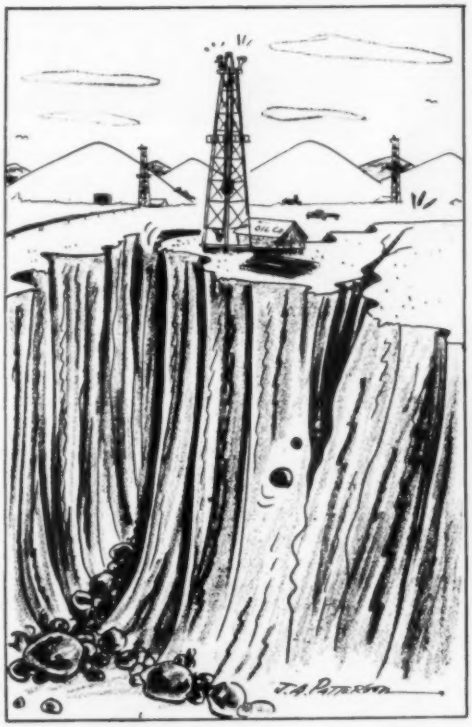

"Relax, Mendolson—we all gotta go sometime."

one test drilling ahead and another old wildcat finally abandoned.

The test abandoned was 1 Voorhees in west 34-32n-45e. Mid Central Drilling Co. officially quit the wildcat which had been idle since February with stuck drill pipe at 3,467 ft. It was originally spudded in in December 1955.

The well drilling ahead was J. O. Blalock 1 Orewitz in NW NW NE 34-32n-45e. It was below 2,200 ft.

● In Nye County, some 12 miles northwest of Standard's White River test, West End Opoteca Mines Co. and Janoil Corp. were drilling ahead in gray lime below 549 ft. on 1 USL.

OKLAHOMA

SOUTH CENTRAL

Third Pay Found at New McClain County Discovery

The Tulip Creek - Ordovician is a third pay zone in the new discovery area at Cooperative Refinery Association 1 Walker-B in C NE NW 18-7n-21w, McClain County. Production has already been proved in the first and second Bromide sands at 8,395-8,425 and 8,667-93 ft., respectively.

A test in the Tulip Creek at 8,739-48 ft. flowed oil at the hourly rate of 50 bbl.

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SOUTHWEST

Simpson Gas Flow Reported at Kiowa Test

The significant north flank of the Wichita Mountains wildcat in Kiowa County, Carter Oil Co. 1 McDonald, NE SE SE 16-7n-14w, flowed gas at the rate of 1,527 M.c.f. on a 24/64-in. choke from Simpson sand at 3,370-74 ft. Perforations at 3,396-3,420 ft. netted 2,000 M.c.f. of gas.

CENTRAL

Checkerboard Discovery Finaled in Logan County

A flush Checkerboard sand discovery was completed in Logan County in the area between Northwest Clayton and Southeast Garden fields. The new pool-opener is J. A. Chapman 1 Briscoe, C SW NE 33-15n-1e.

The well flowed 480 bbl. of oil per day, 42° gravity, on ½-in. choke from perforations at 4,123-33 ft. Two other wells are active in the immediate area.

ROCKY MOUNTAINS

NEBRASKA

Kimball County "J" Sand Discovery

Pan American Petroleum Corp. has completed a wildcat well in the Denver basin.

Pan American 1 Gehrke, located in 7-14n-57w, Kimball County, Nebraska, has been completed and is pumping 313 bbl. of oil a day. The wildcat is producing from the "J" sand, topped at 6,982 ft. Total depth of the well is 7,074 ft., plugged back to 7,038 ft.

Pan American has full interest in the 1 Gehrke and 1,700 acres in the immediate vicinity. Nearest production is at Riggs field, 8 miles south.

Waterton Park Field Conference Announced

The Seventh Annual Conference of the Alberta Society of Petroleum Geologists opens in Lethbridge on Wednesday, September 11 with registration at the Marquis Hotel.

Thursday, September 12, will be devoted to presentation of technical papers at the Civic Auditorium in Lethbridge. Friday and Saturday will be devoted to field trips to the general Waterton Park-St. Mary Lake region.

Papers to be presented at the conference are:

"The Swing Back to Southern Alberta," Dr. T. A. Link.

"Age and Origin of the Sweetgrass Arch," G. C. Wells.

"Cambrian and Precambrian Geology of Southern Alberta," W. C. Gussow.

"Writing on Stone," W. B. Gallup.

"Crowsnest Volcanics," R. E. Follensbee.

"Structure of Porcupine Hills," D. Bossert.

"Structure of the Fernie Coal Fields," J. Crabb.

"Savanna Creek Gas Field," J. Scott.

"Foothills Geology and Geophysics," L. Reed.

"What Magnetic Tape Recording Can Do for the Geologist," E. Hall.

"Photogeologic Interpretation," N. J. Armstrong.

"Stereo-Structural Contouring," E. M. Shearer.

"Pleistocene of Pincher Creek Area," A. Stalker.

Registration requests should be sent to R. L. Slavin, A.S.P.G. Field Conference Accommodation Committee, Mobil Oil Building, Calgary.

Successful Wildcats

SOUTHWEST TEXAS

Atascosa County: Armstrong & Horn 1 Harding, Galba Fugua Sur., A-271 (2½ miles southeast of Jourdanton). IP 76.57 BOPD, ⅛-in., 39°, GOR 480 cu. ft. per bbl., TP 300 psi., perforations 5,074-90 ft. (Navarro). TD 5,111 ft. (New reservoir in Galba area.)

Bastrop County: C. J. Dick and Walter E. Badgett 1 Pearson, James Doyle Sur. (4 miles north of Lytton Springs). IP 153 BOPD, ⅛-in., 39°, GOR 90 cu. ft. per bbl., TP 130 psi., perforations 1,888-92 ft. (Buda). TD 2,096 ft. (New field.)

Dimmit County: Pronto Drilling Co. 1 Morriss, Block 37, Cross "S" Ranch Subd., Section 177-A, Narcisco Aguirre Grant. IP 162 BOPD, $\frac{3}{16}$-in., 31°, GOR 900 cu. ft. per bbl., TP 210 psi., perforations 4,431-37 ft. (San Miguel). TD 4,454 ft. (New pay in Elaine field.)

Pronto Drilling Co. 1 Clark, Trinidad Sanches Sur., A-665. IP 128 BOPD, ⅛-in., 39.4°, GOR 600 cu. ft. per bbl., TP 640 psi., perforations 2,817-23 ft. (Navarro). TD 3,038 ft. (New field.)

Frio County: H. B. Kaulbach 1 McDonald, Section 173, Camilla Cuples Sur., A-267 (12 miles northeast of Pearsall). IP 100 BOPD, 5/32-in., 37°, GOR 200 cu. ft. per bbl., TP 285 psi., open hole 3,597-3,614 ft. (Olmos). TD 3,614 ft. (New field.)

Hidalgo County: The Texas Co. 1 Garcia L. & L. Co., Porcion 42, Dyonision Zamora Sur., A-86 (11 miles northwest of Penita). IP 127.65 BOPD, 21/128-in., 38.7°, GOR 500 cu. ft. per bbl., TP 300 psi., perforations 3,945-50 ft.: (Frio). TD 4,116 ft. (New reservoir and discovery oil well in Bloomberg area.)

George H. Coates 6 Salomon Chapa, Porcion 74, Share 3-B (1 mile northeast of Tabasco). IP 28.36 BOPD, 3/32-in., 43°, GOR 385 cu. ft. per bbl., TP 40 psi., perforations 5,409-10½ ft. (Frior -H-1 sand). (New pay in Tabasco area.)

Maverick County: T. G. Shaw and Louis Pitcock 1 J. K. Burr Estate, Section 3, Block 15, I&GN Sur., IP 86.56 BOPD, 27.8°, GOR 520 cu. ft. per bbl., perforations 2,754-64 ft. (Eagleford-Buda). TD 2,764 ft. (New field.)

McMullen County: Texas Seaboard Oil Co. 1-B Charles Wheeler, Neill McLain Sur., A-553. IP 3,650 M.c.f. daily, absolute open-flow potential, perforations 939-43 ft. (upper Government Wells). TD 1,515 ft. (New gas discovery.)

Starr County: Sun Oil Co. 6 Dionicia Laurel et al, La Saal Colorado Grant. IP 78.66 BOPD, 9/64-in., 43.4°, GOR 4,755 cu. ft. per bbl., TP 1,190 psi., perforations 5,403-06 ft. (Frio F-3-2 sand)). TD 6,705 ft. (New pay in North Sun field.)

TEXAS GULF COAST

Bee County: Texan Oil Co. 1 Manning, J & M. Keeting Sur., A-33 (2 miles west of Blanconia). IP 40,000 M.c.f. daily, absolute open-hole potential, GIR 180 M.c.f. per bbl., 62.8°, SITP 2,500 psi., perforations 4,688-96 ft. (Frio). TD 5,425 ft. (New pay in North Blanconia field.)

Goliad County: Clardy & Barnett 1 Clark, Goliad Town Tract Four League, Range III, Lot 22. IP 12,300 M.c.f. daily, absolute open-flow potential, dry gas, perforations 3,725-28 ft. (Frio). (New field.)

Kleberg County: American Petrofina, Inc., et al 1-A State of Texas, Tract 169, Laguna Madre. Shut-in gas-condensate well, no gage, perforations 9,420-21 ft. TD 9,496 ft. (New pay in Bird Island field.)

Sun Oil Co. 1 Baffin-State, Tract 376, Laguna de Los Olmos (6 miles east of Riviera). IP 9,000 M.c.f. daily, absolute open-flow potential, GIR 142 M.c.f. per bbl., 47.8°, SITP 3,500 psi., perforations 9,033-35 ft. TD 9,155 ft. (New pay in Riviera Beach field.)

Refugio County: Tennessee Gas Transmission Co. 3-H James A. Hynes, Isabella O'Brien Sur., A-6. IP 6,000 M.c.f. daily, absolute open-flow potential, GIR 42 M.c.f. per bbl., 70° SITP 2,365 psi., perforations 6,016-26 ft. (Frio). TD 7,010 ft. (New pay in Refugio-Fox field.)

Sun Oil Co. 1 Palfrey, T. T. Williamson Sur., A-320 (2.7 miles northwest of St. Mary Bayside). IP 14,000 M.c.f. daily, absolute open-flow potential, GIR 17,040 cu. ft. per bbl., 69.8°, CITP 2,495 psi., perforations 7,302-09 ft. TD 9,988 ft. (New field.)

WEST TEXAS

Borden County: Sinclair Oil & Gas Co. 1 Susie Koonsman, 27-2-T&NO Sur., 11 mi. SW Justiceburg. IPP 89 BOPD, 34°-gravity, GOR 176, Spraberry 5,230-30 ft. TD 8,557 ft., ground elev. 2,600 ft.

Runnels County: Geo-Chemical Surveys, Inc., 1 Harris, J. R. Wylie Sur. 62, 2 mi. NW Hatchell, ¾ mi. NE of Gardner lime discovery. Dual completion and new pay in Capps lime. IPP 82 BOPD, 40°-gravity, GOR 400, Capps 3,854-62 ft.; IPP 28 BOPD, 41°-gravity, GOR 200, Gardner 4,213-28 ft. TD 4,237 ft.

Scurry County: Liedtke, Ltd., et al 1 Fuller, 556-97-H&TC, 14 mi. NE Snyder. IPP 137 BOPD, 39-9ravity, GOR 165, Disco 5,032-36 ft. TD 3,057 ft.

KANSAS

Graham County: Murfin Drilling Co. 1 Chas. Dreiling, SE SE SW 28-9s-25w. IPP 98 BOPD, 40°, Lansing-Kansas City 4,026-48 ft. TD 4,110 ft. Opens Southwest Glen Dale Pool.

Clay County: Pure Oil Co. 1 Griffiths, C NE NW 2-9s-4e. IPP 86 BOPD, 26 BWPD, 33°, Mississippi 1,914-40 ft. TD 1,947 ft.

Ellis County: Darby, Cook & Galloway, and Oil Trading Corp. 1 Vine "A," SW NW NE 35-11s-19w. IPP 232 BOPD, 18°, Arbuckle, 3,682-86 ft. TD 3,686 ft.

Russell County: Louis Mai 1 S. & S. Ranch, SE SE SW 36-12s-15w. IPP 80 BOPD, 24°, Arbuckle 3,143-48 ft. TD 3,148 ft. Opens S & S pool.

Ellis County: Legen Oil Producing Co. et al 1 State, NE NE NW 1-14s-19w. IPP 220 BOPD, 35°, Lansing-Kansas City 3,530-38 ft. TD 3,801 ft. New pay in Ft. Hays State College pool.

Tennessee Gas Transmission Co. 1 Sarah M. Stadelman, SW SW SW 3-14s-19w. IPP 66 BOPD, 41 per cent water, 36°, Lansing-Kansas City 3,721-31 ft. TD 3,909 ft. Opens Stadelman pool.

Barton County: Thunderbird Drilling Co. 1 Robl, SE SW NW 30-18s-11w. IPP 214 BOPD, 49.9°, Lansing 3,270-75 ft. TD 3,459 ft. New pay in Bailey pool.

Ness County: Barnett Oil Co. 1 Rothweiler, NW NW SW 3-19s-21w. IPP 30 BOPD, 60 per cent water, 39.8°, Miss. 4,270-75 ft. TD 4,275 ft. Opens Southwest Ryersee pool.

Marion County: Slusser Drilling Co. 1 Theis, NE SW SW 14-19s-4e. IPP 10 BOPD, 10 BWPD, 37°, Miss. 2,324-62 ft. TD 2,362 ft. Opens Southeast Quarry-Siding pool.

Rice County: Bennett & Gould 1 Smith, SE SE NW 29-20s-7w. IPP 35 BOPD, 35 BWPD, cherty cong. 3,313-23 ft. TD 3,323 ft.

Marion County: Anderson-Prichard Oil Corp. 1 Blackmur, NW SE NW 11-21s-2e, IPP 5 BOPD, 81 BOPD, Hunton 2,886-90 ft. TD 2,956 ft.

Edwards County: Branine & Holl 1 Kearny Unit, C SE 35-24s-16w. IP 1,202 M.c.f. of gas per day, Miss. 4,286-92 ft. TD 4,365 ft.

Harvey County: E. H. Adair Oil Co. 1 Gingrass, SE SE NE 17-24s-2e. IPP 96 BOPD, 31.5°, Hunton 3,228-31 ft. TD 3,231 ft. Opens Gingrass pool.

Kiowa County: Gulf Oil Corp. 1 Robbins, C SW NE 31-30s-16w. IP 3,950 M.c.f. per day, Miss. 4,889-90 ft. TD 5,056 ft.

Harper County: Continental Oil Co. 1 T. S. Hudson, NE SW SE 20-31s-7w. IPP 288 BOPD, 46.3°. Simpson sand 4,696-4,708 ft. TD 4,851 ft.

William Gruenerwald 1 Hibbard, NW NW SW 23-34s-9w. IP 4,778 M.c.f. of gas per day, Miss. 4,586-4,622 ft. TD 5,056 ft.

Comanche County: Pure Oil Co. 1 C. H. Tuttle "B," C SW SW 6-35s-20w. IP 2,000 M.c.f. of gas per day, Morrow sand 5,538-43 ft. TD 5,782 ft.

ARKANSAS

Pope County: Carter Oil Co. et al 1 Homer Eakin C-703, SE NE SW 2-8n-19w. IPF 9,245 M.c.f. of gas per day, Barton sand 3,970-4,035 ft.; basal Atoka sand 4,174-92 ft. TD 4,660 ft. New pay (Barton) in Moreland gas field.

COLORADO

Morgan County: McKnab Drilling Co 1 Carl Jess, C SW NE 14-4n-58w. IP 3,000 M.c.f. of gas per day, "D" sand discovery, new field. TD 5,925 ft. "J" sand.

Weld County: Pure Oil Co. 1 Doll-A, C SW NE 31-7n-58w. IP 4,000 M.c.f. of gas per day, "D" sand gas discovery, new field. TD 6,568 ft. "J" sand.

NEBRASKA

Banner County: British-American Oil Producing Co. 2 Williston "A," C SE NW 13-17n-53w. IPP 308 BOPD, "J" sand discovery, new field. TD 5,320 ft.

Cheyenne County: Petroleum, Inc. 1 Slama, C NW NE 28-15n-52w. IPP 136 BOPD, "J" sand discovery, new field. TD 5,500 ft. Skull Creek.

Kimball County: Pan American Petroleum Corp. 1 Gehrke, C NE SE 7-14n-57w. IPP 313 BOPD, "J" sand discovery, new field. TD 7,074 ft.

Union Pacific's new veep is . . .

. . . Oil Man for a Railroad

LEE S. OSBORNE, formerly assistant vice president of Union Pacific Railroad Co., was recently elevated to a full vice presidency.

What's all that got to do with the petroleum industry?

Osborne was named vice president in charge of oil development, which at Union Pacific has plenty to do with it.

In his new job, Osborne runs an organization with about 40,000 bbl. of production daily from eight fields in California, Wyoming, and Colorado, plus substantial gas production in Wyoming. Last year, Osborne's department showed net earnings of $26.5 million before payment of federal income taxes.

All this is handled by a work force, including geologists, production men, etc., of only 65 persons.

No railroading involved . . . Being the head of the equivalent of a large independent oil company within the framework of a railroad might appear to present some unusual problems. But such is not the case, according to Osborne.

"Our branch is completely foreign to ordinary railroad operations, but coordination and cooperation with the railroad-thinking management is extremely close," he says.

The physical nature of U.P.'s huge holdings presents an interesting variation from the usual oil-company operations, Osborne points out.

The company's principal production has been from approximately 1,300 acres in Wilmington, Calif., originally acquired and held for industrial development by the old Los Angeles & Salt Lake Railroad Co., now part of U.P. The company has approximately 715 wells producing more than 22,000 bbl. daily on the property.

The company also holds mineral rights on nearly 8 million acres generally consisting of the odd-numbered sections within boundaries 20 miles on each side of the right-of-way between Ogden, Utah, and the Kansas and Nebraska borders.

U.P.'s practice in developing these holdings has generally been to join with some other company holding acreage between its odd-numbered sections. Arrangements usually call for the other company to be the operator, with the railroad paying its share of the cost.

With these large holdings, mostly in sedimentary basins, every indication is that the activity of Osborne's department will continue to grow.

LEE S. OSBORNE
. . . like a large independent.

In marketing its crude, U.P. generally exchanges a good part of it for refined products.

Up from the ranks . . . Osborne brings to U.P. an extensive background in exploration and development of oil properties and prospects.

After graduating from Stanford University in 1930 with a degree in geology, Osborne's first venture in the oil business was doing exploratory work in California's San Joaquin Valley for Texas-Pacific Coal & Oil Co.

In January, 1935, Osborne joined Shell Oil Co. in various drilling and production jobs, rising to division petroleum engineer operating out of Shell's Bakersfield office. From early in 1948 until he joined U.P. in May 1949, he worked as Shell division manager in both Calgary and Long Beach.

He served as general field superintendent for U.P.'s producing properties during his first years with the railroad. Later he became assistant to the vice president in charge of oil development, then assistant vice president, and finally a full vice president.

Osborne lives in Whittier, a Los Angeles suburb, with his wife and daughter.

Alex Aven, former staff geologist for British American Oil Co., Ltd., in Denver and Casper, is now manager of the land department for Eason Oil Co., Oklahoma City. Aven also worked in the Louisiana Gulf Coast area with Continental Oil Co.

Personals

George Grimes has moved up from refinery superintendent for Cosden Petroleum Corp. at Big Spring, Tex., to general superintendent of the firm's three refineries. The other two plants are in Colorado City and Hawley, Tex. Grimes joined Cosden in 1929 and helped run the first barrel of oil processed at the Big Spring plant. He was made night superintendent in 1933 and was later superintendent of Cosden's old plant at Graham, Tex. He returned to Big Spring in 1945 and was made refinery superintendent there the following year.

Richard C. Kerr, assistant to the manager of production and pipelines for Arabian American Oil Co., has retired after 37 years in the oil business. Growing up in the oil patch, he worked as a roustabout and geologist, and once was a partner in the air-mapping firm doing aerial photography in Saudi Arabia. He was formerly assistant to the chief geologist in charge of seismograph operations in Saudi Arabia for Standard Oil Co. of California.

Arthur R. Smith, recently elected progressive conservative member for Calgary-South in the Canadian Government, has been named executive assistant with Pacific Petroleums, Ltd. He was formerly a member of the Alberta legislative assembly and executive assistant for Anglo American Exploration, Ltd.

J. E. ROUSE

John E. Rouse, former executive of Standard Oil Co. (Ind.), has been named president of Utah Southern Oil Co. of Salt Lake City to succeed **George T. Hansen,** founder. Hansen takes over the new position of board chairman. **George T. Hansen, Jr.,** was named vice president in charge of operations. Rouse retired from Indiana Standard in 1953 after being with the company for more than 30 years. His last position was vice president in charge of operations for Stanolind Oil & Gas Co., now Pan American Petroleum Corp. He was previously general superintendent and later manager of Indiana Standard's Rocky Mountain division. Rouse, whose home is Denver, started his career with Standard Oil Co. of New Jersey and was once refinery superintendent for Continental Oil Co.

Personals

J. W. MOORE

J. W. Moore, senior exploitation engineer in Shell Oil Co.'s head office in New York, moves to Houston as division production department manager. He succeeds **G. D. Robertson,** who retired July 1 after more than 23 years with Shell. Moore joined the company as a junior exploitation engineer at Houston in 1939. After several assignments in Texas and Louisiana, he returned to Houston as senior exploitation engineer in 1954 and was promoted to Houston division exploitation engineer the same year. He went to New York in March of this year.

J. F. Homer, district superintendent for Humble Oil & Refining Co., has been transferred from Patterson, La., to Anchorage, Alaska.

John W. Johnson has been employed as a geologist with Cullum & Brown Drilling Co., North Kansas City, Mo. Formerly he was field superintendent for Texas-Western Co. at Chanute, Kans.

Ed Smigel has been promoted from production foreman for Ohio Oil Co. at Sidney, Neb., to production superintendent for Ohio at McFadden, Wyo.

William W. Whitley, geologist for Intex Oil Co., has been transferred from Dallas to Denver.

Oscar C. Holmes, production operator, and Leroy D. Lane, petroleum engineer, have been transferred from the Houston division of Sinclair Oil & Gas Co. to eastern Venezuela with Sinclair Oil & Refining Co.

H. K. Wheeler, assistant refinery manager at El Dorado, Ark., for American Oil Co., has been promoted to director of planning in the research and development department office in New York City. Wheeler, who joined Standard Oil Co. (Ind.) as a design engineer in 1944, was transferred to El Dorado in 1950. **Guy L. Honeycutt** takes over Wheeler's job as assistant manager at El Dorado. In other changes at American Oil, **C. F. Feuchter** moves from manager of planning to manager of manufacturing economics in New York City and **Roscoe F. Stahl** becomes his assistant.

Norton Perry, a recent graduate of the University of Missouri, is now a geologist with Magnolia Petroleum Co. in Mount Vernon, Ill.

LeRoy B. Fox has been appointed manager of the asphalt department of Socony Mobil Oil Co., Inc., to succeed **George B. Christie,** retired. Fox was manager of the fuel-oil division of the gasoline and fuel oil department. He is succeeded by **Leonard S. Marshman.**

William S. King, a former geologist with The Texas Co. at Los Angeles, has joined the firm of Wm. Ross Cabeen & Associates, North Hollywood, Calif., as a geologist.

O. G. Howe has been promoted from engineer on the general office staff of the Oklahoma Natural Gas Co. at Tulsa to mechanical supervisor of compressor stations. He replaces **D. R. Alley,** who retired August 1.

Robert J. Brakey, production foreman with Amerada Petroleum Corp., has been transferred from Fort Pierce, Fla., to Tioga, N. D.

Chapman Cronquist, exploitation engineer with Shell Oil Co., has been transferred from Houston to Westwego, La.

Donald L. Nichols has been promoted from plant foreman with Magnolia Petroleum Co. at Healdton, Okla., to assistant district superintendent for Magnolia at Midland, Tex.

James Ward has been named manager of the Portland, Ore., office of Sinclair Oil & Gas Co. He succeeds **Henry DeJong,** who transferred to Denver.

Robert H. Yarger and **Jack W. Holloway,** district foremen of Sinclair Oil & Gas Co., have traded jobs. Yarger has moved to Bristow, Okla., while Holloway went to Healdton, Okla.

Carl E. Matthews, drilling engineer at Farmington, N. M., with Northwest Production Corp., has been transferred to Salt Lake City as drilling engineer with Pacific Northwest Pipeline Corp., the parent company.

Joseph Walla, Jr., has joined Northern Natural Gas Producing Co. as district geologist at Calgary. The firm is a subsidiary of Northern Natural Gas Co. Walla, with 14 years' experience in the petroleum industry, was in Venezuela with Creole Petroleum Corp. for 10 years before joining Northern Natural.

Rex Shaver, president of H. L. Rowley, Inc., has been named assistant to the president of Rimrock Tidelands, Inc. Both firms are affiliates of Big Chief Drilling Co. Shaver will coordinate contract drilling activities and serve as the president's representative in the Gulf Coast area on his new job. He joined Big Chief in 1948 as contract representative. In 1951, he was made vice president of H. L. Rowley, Inc., advancing to executive vice president in 1955 and to president in February 1956. Shaver started his oil-industry career in 1935 with The Texas Co., serving 13 years on various assignments before joining Big Chief.

Dr. Robert L. Purvin has resigned as president of Purvin & Gertz, Inc., Dallas consulting engineering firm, to become executive vice president of Foster Grant Co. of Leominster, Mass., maker of plastics and plastics raw materials. Dr. Purvin was formerly with Humble Oil & Refining Co. and was acting president of Texas Butadiene & Chemical Corp. during the company's first year of operation. He was the first to combine the Houdry butadiene process with sulfuric acid alkylation to get butadiene and aviation gasoline directly from butane hydrocarbons. Texas Butadiene & Chemical based its operations on the new method.

Stanley E. Shields has been promoted to research associate in the pilot-plant division of Standard Oil Co. (Ind.) and **Reimer E. Probst** has moved up to senior research scientist in the company's lubricants division of the research department.

John Muensinger, roving geologist for Continental Oil Co., has been named assistant to **W. H. Fitzpatrick,** Conoco district geologist at Amarillo, Tex.

Tom Benton, Walter Moody, and **Elmer Clark** have formed Planet Engineers, Inc., petroleum consulting firm in Durango, Colo. Benton leaves General Petroleum Corp., which he joined in 1953 as senior petroleum engineer, joint venture operations, production department. Moody was division petroleum engineer in Seaboard Oil Co.'s western division. Clark was formerly senior surveyor in the Rocky Mountain region for Shell Oil Co.

Personals

John N. Richart has joined Pure Oil Co. as geologist in Olney, Ill.

Julius E. Spector has been named vice president of Sun Chemical Corp. and general manager of the firm's paints and finishes group.

Nelson K. Moody, former chief geophysicist at Seismograph Service Corp. of Mexico, has returned to Tulsa to head Seismograph's new seismic replay division.

Jesse R. Moser, former vice president of engineering with O'Neill Oil Co. in Inkster, Mich., now has the same job with Super-Steam Corp. in Dearborn, an affiliate.

G. L. Metcalfe, petroleum engineer with the Alberta Oil and Gas Conservation Board for the past year, has joined New Chamberlain Petroleums.

Frank M. Bateman is new president of the 18-month-old Association of Oilwell Servicing Contractors. He is president of Bateman & Whitsitt, Inc., well-servicing firm of Hobbs, N. M. Bateman succeeds **J. C. (Calvin) Williamson** of Odessa Tex., who recently sold his interests in Williamson Well Servicing Co., operating in the Permian basin.

John S. Wintringham has been appointed to the newly created post of senior research advisor at Ethyl Corp.'s Detroit research laboratories. He takes over many former responsibilities of **J. B. Macauley,** who resigned to become Deputy Assistant Secretary of Defense for research and engineering.

Myron C. Kiess, former geological manager for Sunray Mid-Continent Oil Co., has been named exploration manager for Schermerhorn Oil Corp. and Kenwood Oil Co., both of Tulsa. Kiess, who recently resigned his Sunray post, was with Pure Oil Co. for 24 years until he joined the old Mid-Continent Petroleum Corp. as chief geologist in 1950. He later became exploration manager for Mid-Continent and was made geological manager when the company merged with Sunray Oil Corp. in 1955. Kiess taught geology at his alma mater, the Colorado School of Mines for a year before joining Pure.

Joe Sahraie, a June graduate of the University of Texas, has joined Oilfield Research in Evansville, Ind., as petroleum engineer.

John E. Capshaw has been employed as a petroleum engineer with Shell Oil Co. at Sterling, Colo. He recently was discharged from the U. S. Army.

Esso Research Laboratories in Baton Rouge has added **W. E. Blankenstein, R. J. Fox, D. E. Gensheimer, J. A. Johnson, H. E. Merrill, R. L. Ray, Donald Schwartz,** and **H. E. Stanley** to its staff of chemists. New chemical engineers are **R. G. Beecher, E. N. Cart, R. L. Dodson, G. D. Fisher, W. J. Hatcher,** and **K. H. Moritz.**

D. W. GRESSER

Donald W. Gresser, exploration manager, and **Frederick W. Nantker,** land manager, head a new division headquarters office for Shell Oil Co. at Durango, Colo. Both men are from Durango. **J. A. Peterson** is division stratigrapher and **R. P. Thomas** is division geologist. Both are from Salt Lake City. The new division will operate southeast of the Colorado River and west of the Continental Divide. A major part of its work will be in the Four Corners area.

DEATHS

Col. George A. Burrell died August 16 at his home in New York City after a long illness. He was chairman of the board of Burrell Corp., Pittsburgh, which he founded in 1923. He served as president of the firm until 1952, when he resigned to become board chairman. Burrell received the Hanlon Award in 1948. The award is the highest given by the Natural Gasoline Association of America. A chemical engineer, Burrell discovered helium in Texas and initiated the U. S. Government's helium program in 1917. He also served with the U. S. Bureau of Mines and helped initiate the Chemical Warfare Service of the U. S. Army in World War I. Burrell served as an engineering consultant for the chemical, natural-gas, and petroleum industries from 1919 until 1943.

Claude B. Pennington, Jr., 35, independent operator of Baton Rouge, was killed August 16 in a rig accident near Jackson, La. Pennington was a business associate of his father, **Dr. C. B. Pennington,** also of Baton Rouge.

Loren R. York, 74, founder of four northeastern Wyoming petroleum firms, died recently at his Newcastle, Wyo., home. York established Western Oil & Gas Co., Yorman Oil Co., York Minerals, and York, Inc.

Ted Becker, 38, geologist for Union Pacific Coal Co., was killed recently in a helicoper crash at Rawlins, Wyo. Becker maintained homes in Rock Springs, Wyo., and Las Vegas, Nev.

A. B. Williams, 56, West Coast division manager for H. C. Smith Oil Tool Co., died August 10 in Ventura, Calif.

Ronald R. Hermes, independent oil operator of Abilene, Tex., died August 18. He was 42. Graveside rites were held August 20 at Anadarko, Okla., his hometown. Hermes had been an independent operator since 1955 when he resigned as geologist and district manager for American Trading & Production Corp. in Abilene.

Elbert Tipton, 22, of Hobbs, N. M., and **Joe Green,** 19 of Odessa, Tex., employes of B & J Well Servicing Co., were fatally injured August 17 when gas blew out and caught fire during cementing operations at an oil well 23 miles west of Hobbs. The well was drilled for Southern California Petroleum Corp.

Orville Harden, 63, former vice president and vice chairman of the executive committee of Standard Oil Co. (N. J.), died August 17 in New York. Harden retired from Jersey in 1953 due to illness and had suffered a critical illness in Florida earlier this year. At one time, he also was a director of Arabian American Oil Co., representing Jersey Standard on the board.

Allen Price Grace, 74, died August 17 at his home in Tulsa. He was refrigeration engineer for the old Mid-Continent Petroleum Corp. refinery in Tulsa for 29 years before retiring 3 years ago.

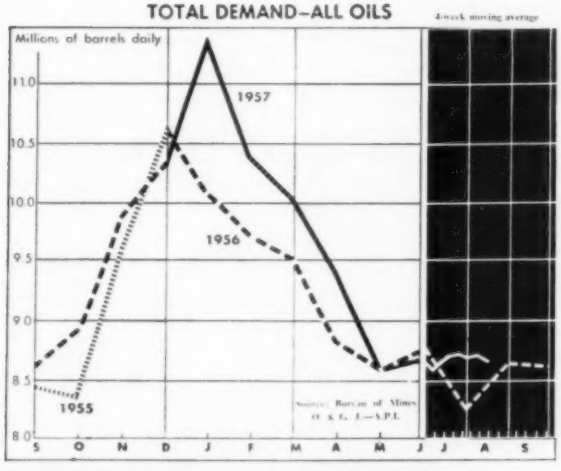
George Dewey Hutchinson, 59, independent oil operator of Okmulgee, Okla., died August 20 in Tucson, Ariz.

E. W. (Ted) Hughes, 77, retired Casper, Wyo., oil operator, died recently in a Casper hospital.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,835,925	UP	45,125	DOWN	371,670
Crude stocks	284,372,000	DOWN	1,450,000	UP	9,983,000
Completions	1,118	DOWN	3	DOWN	157
Refinery runs	7,969,000	DOWN	39,000	UP	70,000
Gasoline stocks	172,136,000	DOWN	837,000	DOWN	4,066,000
Kerosine stocks	33,021,000	UP	467,000	UP	2,304,000
Distillate stocks	146,703,000	UP	4,704,000	UP	17,769,000
Residual stocks	50,923,000	UP	785,000	UP	5,927,000
Four-product stocks	402,783,000	UP	5,119,000	UP	21,934,000
Total imports	1,609,900	DOWN	70,200	UP	285,100



One Bright Spot in a Dull Market—Gasoline Stiffens in the Midwest

ONE STAR twinkles on our markets page this week. It marks a stiffening of the bottom quotation for gasoline in the Mid-Continent. It's a pretty dim star, but it gives refiners a little hope that the clouds may be thinning.

Here's what's happening: With several refineries closed by strikes, and gasoline consumption in the Midwest really brisk in recent weeks, many refiners are down near the bottom of normal working stocks. Several are under pressure to increase their inventories in Great Lakes Pipe Line terminals. They can't borrow gasoline because nobody wants to be paid back in product late in the fall.

So some are buying gasoline. Last week they couldn't pick up anything but driblets at 11.25 cents per gallon (for 89 octane). So they're willing to pay 11.50 to cover their commitments for product.

This is just a teeny price stiffening for one product in one section of the country. And it's inconsistent with the lassitude of an overstocked market all over the rest of the map. The bullishly inclined profess to see it as presaging a general tightening of the whole oil-price structure. But the bears brush it off as a temporary local situation.

Mixed-stream mixup . . . When comparing current refinery runs for the same period last year, there is one fact that you should keep in mind. Reports of refinery runs are not on exactly the same basis as last year.

Most of the change is in the Louisiana Gulf Coast district. The Bureau of Mines was having difficulty trying to balance pipeline reports of crude moved to refineries and refinery reports of crude receipts. The confusion was caused by cycle condensate and natural gasoline mixed in crude. These materials came in the crude stream, and in some cases were classified as crude on refinery reports of receipts and runs.

There was some difference of opinion as to the correct way to report. However, the bureau's instructions are specific in asking that, "Natural gasoline, L.P.G., and cycle products mixed with crude should be separated and reported under items . . ."

The accompanying table shows a big drop in crude input and a corresponding gain in use of gas liquids starting with October 1956. The figures indicate there may have been about 50,000 bbl. daily credited to crude runs prior to the change in October which now is listed as an input of gas liquids.

The bureau has not made a revision of 1956 crude runs. So, if you would like a better comparison of current runs with runs in corresponding weeks last year, either add about 50,000 bbl. daily to current runs or take that amount off last year's total. That is, up to October.

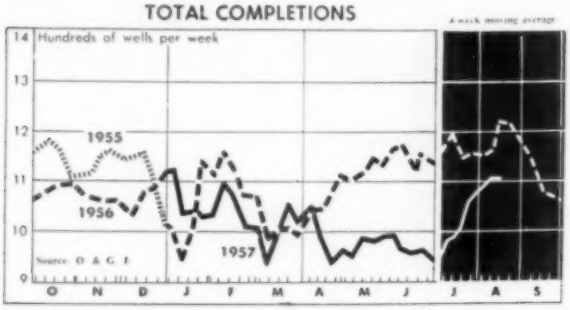
INPUT AT LOUISIANA GULF COAST REFINERIES*

(Thousands of barrels daily)

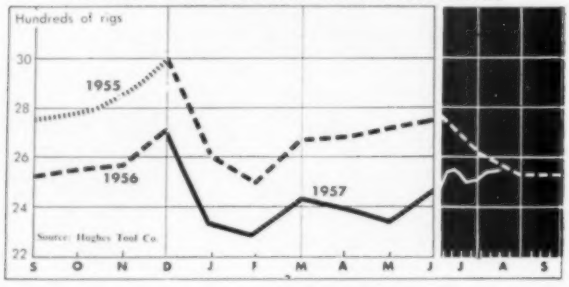
	1956			1957		
	Crude	Gas liquids	Total	Crude	Gas liquids	Total
January	696.5	21.8	718.3	704.5	63.7	768.2
February	692.0	18.0	710.0	684.7	63.8	748.5
March	713.3	20.0	733.3	666.3	59.3	725.6
April	677.9	20.9	698.8	664.3	58.9	723.2
May	710.2	19.9	730.1	652.5	68.7	721.2
June	740.2	19.5	759.7	....	....	....
July	712.8	21.3	734.1	....	....	....
August	713.8	19.2	733.0	....	....	....
September	698.7	28.2	726.9	....	....	....
		New Basis				
October	649.6	62.4	712.0	....	....	....
November	666.8	71.6	738.4	....	....	....
December	678.8	73.6	752.4	....	....	....

*Bureau of Mines. Does not include rerun of unfinished oils.

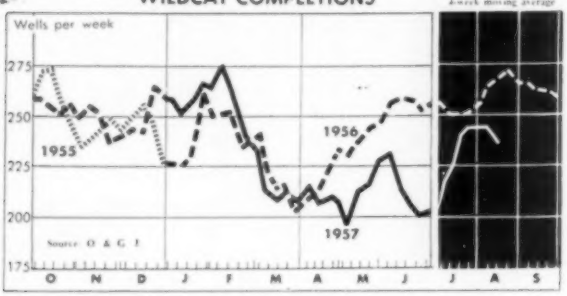
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	8-19-57	8-12-57	8-20-56
North Central and East	103	104	127
Southeast	43	37	31
Okla., Kans., Ark., Mo.	449	458	443
Louisiana	444	424	442
North and East Texas-Panhandle	362	367	364
Gulf and South Texas	207	208	232
West Texas-New Mexico	553	540	478
Rocky Mountain	279	293	274
Pacific Coast	112	115	118
Total United States	2,552	2,546	2,509
Canada	183	176	275

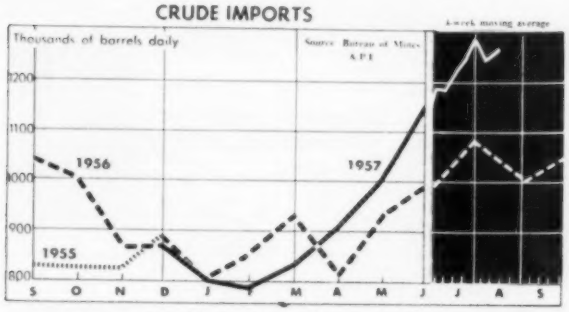
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 17, 1957

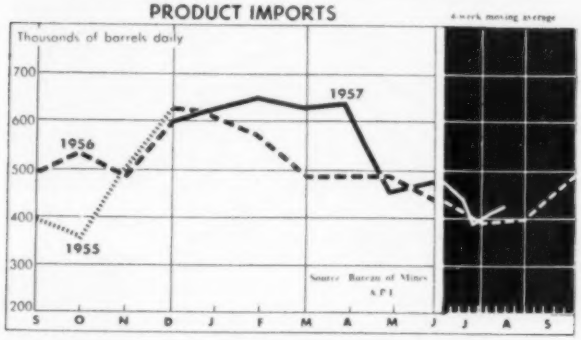
	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1957	1956	Total	Crude	Cond.	Gas	Dry	1957	1956
Alabama	1	0	0	0	1	0	1,853	61	‡67	1	0	0	0	1	19	‡30
Arkansas	34	21	0	0	13	0	98,994	680	526	6	2	0	0	4	126	115
California	56	36	0	1	16	3	253,424	1,343	1,389	11	0	0	0	11	333	308
Colorado	15	4	0	1	10	0	76,407	538	740	10	0	0	1	9	363	374
Illinois	68	33	0	0	35	0	151,949	1,580	2,424	18	1	0	0	17	400	475
Indiana	15	5	0	0	10	0	26,981	388	412	1	0	0	0	1	78	88
Kansas	87	38	0	5	42	2	308,015	2,617	3,243	20	1	0	0	19	525	678
Kentucky	34	8	0	4	22	0	64,283	887	1,137	7	0	0	0	7	179	267
Louisiana	73	31	1	12	29	0	692,023	2,374	2,446	14	1	0	1	12	424	488
North	15	7	1	2	5	0	67,168	828	1,032	2	0	0	0	2	111	160
South	42	18	0	8	16	0	471,170	1,093	1,132	8	1	0	1	6	256	277
Offshore	16	6	0	2	8	0	153,685	453	282	4	0	0	0	4	57	51
Michigan	6	5	0	0	1	0	22,830	259	279	1	0	0	0	1	96	102
Mississippi	4	1	0	0	3	0	26,627	230	281	4	1	0	0	3	121	132
Montana	5	4	0	0	1	0	28,402	243	258	1	0	0	0	1	86	91
Nebraska	25	11	0	0	14	0	144,313	548	654	9	0	0	0	9	305	317
New Mexico	42	16	0	16	9	1	197,831	1,323	1,205	7	1	0	0	6	175	155
Northwest	19	2	0	15	1	1	86,099	525	474	0	0	0	0	0	62	46
Southeast	23	14	0	1	8	0	111,732	798	731	7	1	0	0	6	113	109
New York	9	4	0	0	0	5	9,250	288	.....	0	0	0	0	0	4	.....
North Dakota	3	1	0	0	2	0	17,379	172	159	2	0	0	0	2	72	50
Ohio	36	19	0	6	9	2	82,058	688	637	0	0	0	0	0	7	6
Oklahoma	129	70	1	4	48	6	394,991	3,889	5,465	18	1	0	1	16	447	569
Pennsylvania	11	0	0	7	4	0	72,251	442	†747	3	0	0	0	3	39	†16
Texas	409	242	14	13	137	3	1,767,184	13,715	14,240	91	12	0	1	78	3,396	3,592
District 1	37	22	1	1	13	0	80,198	796	*2,066	9	1	0	0	8	276	*699
District 2	26	6	3	3	14	0	158,618	488	*1,681	9	0	0	1	8	182	*532
District 3	21	9	3	0	9	0	150,095	1,098	.....	8	1	0	0	7	323	.....
District 4	30	11	2	2	15	0	168,225	884	.....	11	2	0	0	9	303	.....
East	29	21	0	0	8	0	129,324	812	722	4	0	0	0	4	239	262
District 7-B	42	15	1	0	26	0	146,797	1,779	.....	18	2	0	0	16	644	.....
West	111	92	2	0	15	2	569,665	3,889	3,799	14	4	0	0	10	574	608
District 9	80	51	0	0	28	1	223,527	3,051	*5,120	12	1	0	0	11	784	*1,415
District 10	33	15	2	7	9	0	140,735	918	852	6	1	0	0	5	71	76
Utah	9	2	0	0	7	0	47,980	129	83	6	0	0	0	6	71	49
West Virginia	15	2	0	11	2	0	39,414	398	417	0	0	0	0	0	19	13
Wyoming	28	11	0	0	17	0	107,045	522	505	9	0	0	0	9	177	143
Nev., Mo., S. D.	4	0	0	0	4	0	7,123	62	65	4	0	0	0	4	45	57
Total U. S.	**1,118**	564	16	80	436	22	4,638,607	33,376	37,379	**243**	20	0	4	219	7,507	8,115
Total prev. week	1,121	534	17	76	468	26	4,300,427	.....	.....	237	21	0	1	215	.....	.....
Cum. 1957	33,376	17,340	301	2,428	12,603	704	138,588,607	.....	.....	7,507	787	63	279	6,378	.....	.....
Western Canada	59	37	0	1	20	1	256,339	1,937	1,834	16	4	0	1	11	553	.....

*Districts: 2 & 3, 1 & 4, 9 & 7-B, formerly combined. †Incl. New York. ‡Incl. Florida and Georgia.

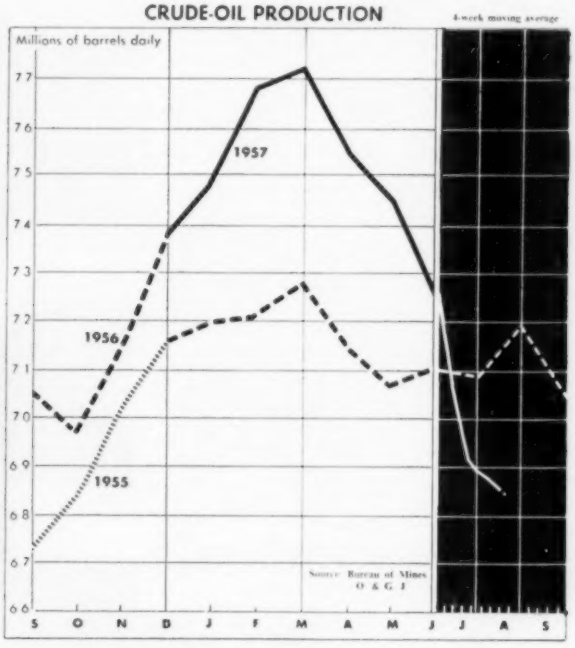
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

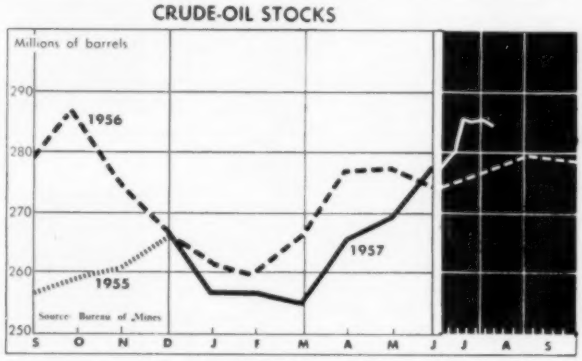


DAILY AVERAGE PRODUCTION FOR WEEK

	August 17, 1957			Aug. 10
	Crude oil	Lease condensate	Total	total
Alabama	13,675	.....	13,675	13,700
Arkansas	84,900	300	85,200	85,150
California	924,600	.....	924,600	925,300
Colorado	150,600	.....	150,600	149,100
Eastern	52,800	.....	52,800	52,500
Florida	1,300	.....	1,300	1,300
Illinois	163,300	.....	163,300	162,900
Indiana	27,800	.....	27,800	29,000
Kansas	†351,900	.....	†351,900	†335,950
Kentucky	39,300	.....	39,300	39,000
Louisiana	723,100	72,500	795,600	796,000
North	123,100	2,500	125,600	126,000
South	600,000	70,000	670,000	670,000
Michigan	25,200	.....	25,200	24,300
Mississippi	103,800	4,400	108,200	108,200
Montana	74,700	.....	74,700	73,050
Nebraska	52,050	.....	52,050	52,600
Nevada	100	.....	100	100
New Mexico	245,800	3,900	249,700	249,400
North Dakota	39,850	.....	39,850	39,550
Oklahoma	†562,600	.....	†562,600	†537,600
Texas	2,760,000	53,700	2,813,700	2,813,700
Dist. 1	51,000	450	51,450	51,450
Dist. 2	126,000	8,450	134,450	134,450
Dist. 3	404,000	26,400	430,400	430,400
Dist. 4	210,000	6,200	216,200	216,200
Dist. 5	36,000	300	36,300	36,300
Dist. 6	122,000	6,300	128,300	128,300
East Texas Field	173,000	.....	173,000	173,000
Dist. 7-B	151,000	50	151,050	151,050
Dist. 7-C	143,000	3,575	146,575	146,575
Dist. 8	1,033,000	1,200	1,034,200	1,034,200
Dist. 9	204,000	350	204,350	204,350
Dist. 10	107,000	425	107,425	107,425
Utah	11,500	.....	11,500	11,100
Wyoming	292,100	.....	292,100	291,150
Others	‡150	.....	‡150	‡150
Total U. S.	6,701,125	134,800	**6,835,925**	6,790,800
Change from previous week, up	.....	.....	**45,125**	
Canada	†450,143	.....	†450,143	†470,500
Total U. S. production—January 1-August 17			1,691,565,925 bbl.	
Same period last year (crude plus condensate)			*1,646,380,839 bbl.	

*Includes 28,448,930 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

CRUDE-OIL STOCKS



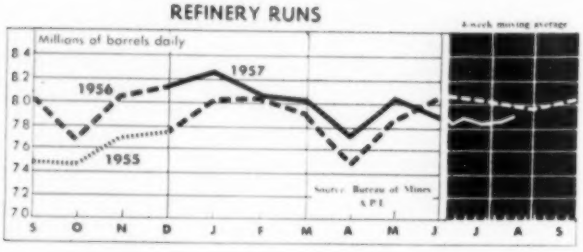
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

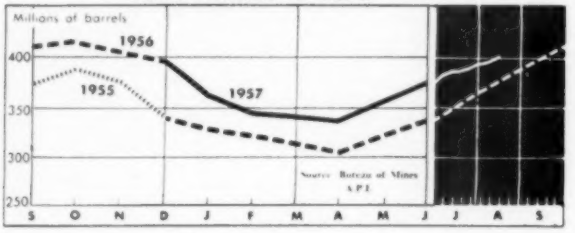
	8-10-57	8-3-57	8-11-56
Pennsylvania Grade	3,052	2,996	2,526
Other Appalachian	1,635	1,540	2,427
Illinois, Indiana, Michigan	11,391	10,891	10,436
Nebraska, North Dakota	2,451	2,213	2,131
Kansas	10,732	11,150	8,441
Oklahoma	22,413	22,399	27,395
Arkansas	2,619	2,522	2,716
Louisiana	18,663	18,763	16,001
North	3,092	3,088	2,472
South	15,571	15,675	13,529
Mississippi, Ala., and Fla.	2,609	2,765	3,255
New Mexico	8,995	9,220	8,378
Texas	127,959	130,048	122,451
East Texas proper	10,670	10,228	9,280
West Texas	61,792	63,704	58,782
Texas Gulf	23,646	23,603	23,069
Other Texas	31,851	32,513	31,320
Wyoming	17,817	17,900	20,024
Other Rocky Mountain	6,419	6,515	6,835
California	30,244	29,899	27,352
Foreign	†17,373	17,001	14,021
Total	284,372	285,822	274,389

*Bureau of Mines. †Includes 4,321,000 bbl. in California.

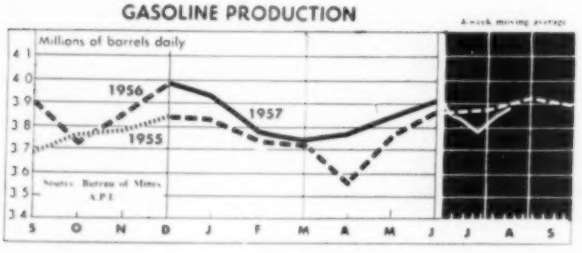
REFINERY RUNS



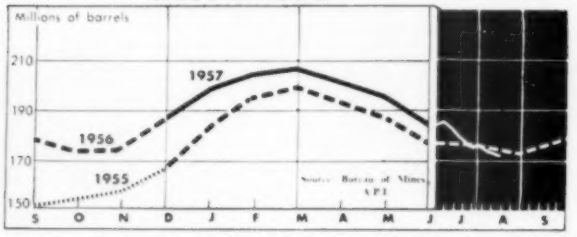
FOUR-PRODUCT STOCKS



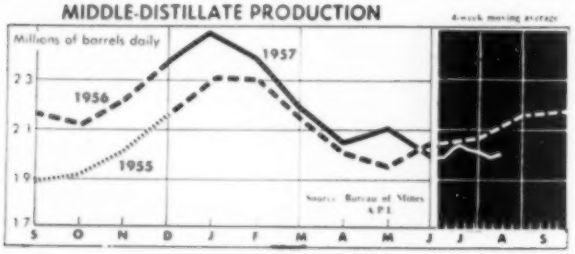
GASOLINE PRODUCTION



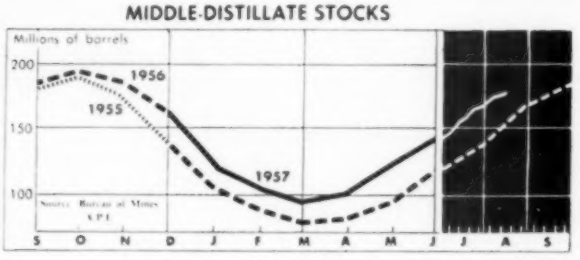
GASOLINE STOCKS



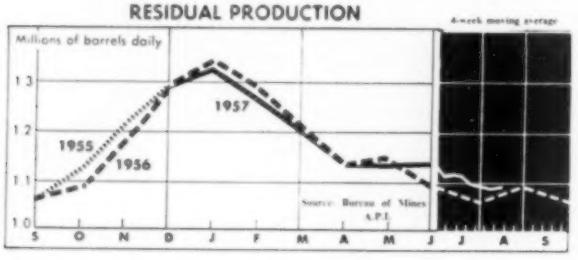
MIDDLE-DISTILLATE PRODUCTION



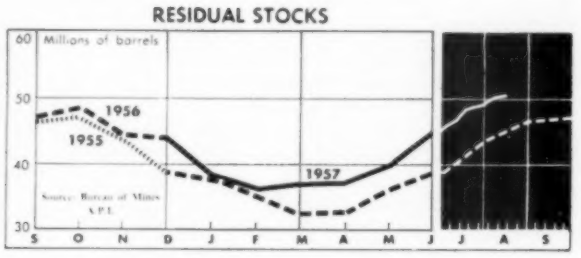
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT—AUGUST 16, 1957

(Thousands of barrels)

District—	Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.	Stocks‡— Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1956— Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.
East Coast	1,283	524.8	30.2	339.6	259.6	40,882	13,371	52,932	12,935	1,140	492.1	32.6	320.6	181.1
Appalachian:														
District 1	96	44.7	3.9	20.0	4.9	4,328	574	3,075	511	99	38.0	3.3	23.9	5.2
District 2	46	29.4	1.7	8.6	7.0	2,544	592	793	247	106	51.7	4.9	17.1	12.6
Ind., Ill., Ky.	1,262	635.4	56.4	246.0	130.9	29,736	6,641	21,147	5,329	1,407	739.5	72.6	286.2	150.2
Minn., Wis., Dak.	108	50.4	4.1	33.6	10.1	5,420	1,477	7,422	500	70	34.8	6.2	19.3	3.8
Okla., Kans., Mo.	768	414.9	13.9	174.4	26.3	13,918	1,738	13,622	1,045	703	375.5	15.4	167.3	29.8
Inland Texas	285	201.9	12.4	50.9	21.1	6,627	418	2,380	1,879	274	202.2	5.9	52.7	25.1
Texas Gulf Coast	1,913	938.0	86.7	490.6	222.1	23,410	3,160	17,419	7,392	1,966	948.9	111.7	498.2	241.1
La. Gulf Coast	670	371.0	34.6	173.8	56.9	10,377	3,406	7,179	1,578	714	361.2	47.9	196.3	55.1
N. La. and Ark.	78	24.0	4.4	21.1	5.6	3,779	954	2,107	165	103	38.0	5.0	24.2	6.9
Rocky Mountain:														
New Mexico	24	13.1	0.7	5.1	2.4	465	11	110	77	26	13.5	0.2	5.1	3.4
Other Rocky Mt.	281	136.9	3.6	61.0	37.1	5,738	302	3,207	942	281	129.8	3.7	61.4	33.5
West Coast	1,155	509.9	12.0	150.3	336.4	24,912	377	15,310	18,323	1,106	497.1	4.0	166.7	343.3
Aug. 16, 1957	7,969	3,894.4	264.6	1,775.0	1,120.4	172,136	33,021	146,703	50,923	7,995	3,922.3	313.4	1,839.0	1,091.1
Aug. 9, 1957	8,008	3,971.0	295.4	1,725.3	1,078.3	172,973	32,554	141,999	50,138	.....	.....	.....	.....	.....
Aug. 17, 1956	7,899	3,910.3	324.0	1,812.4	1,128.0	176,202	30,717	128,934	44,996	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
★ Regular (89 octane)	11.50-11.75
★ Premium (98 octane)	14.25-14.50
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	11.00-11.50
Regular (92 octane)	11.25-11.75
Premium (97 octane)	12.75-13.25
Premium (98 octane)	13.00-13.50
California (rack):	
Regular (88 octane)	12.9
Premium (96 octane)	14.9
Premium (98 octane)	15.4
Caribbean area (cargoes):	
Regular (87 octane)	10.875
Premium (93 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.0
Breckenridge:	
Grade 26-70	3.5

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.50-10.00
Diesel oil (58 d.i. and above)	9.125-9.75
Distillate No. 1	9.125-9.75
Distillate No. 2	8.50-9.00
Gulf Coast (cargoes):	
Kerosine 41-43	8.75-9.50
Distillate No. 2	8.75-9.50
New York Harbor (barges):	
Kerosine 41-43	10.75
Distillate No. 2	10.25
Diesel fuel, 48-52 d.i.	10.55
Caribbean area (cargoes):	
Distillate No. 2	9.00

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.85-2.10
Gulf Coast (cargoes):	
Bunker C fuel	$2.50-2.75
New York Harbor (barges):	
Bunker C fuel	$2.95
Caribbean (cargoes):	
Bunker C	$2.55
California (rack):	
Bunker C fuel, Los Angeles	$2.85-3.00

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	28
200 vis. neutral (180 at 100°), 25 p.t.	26

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.67	....	....	....	....
15-15.9	2.71	....	....	....	$1.89
16-16.9	2.74	....	....	....	1.94
17-17.9	2.78	....	....	....	1.99
18-18.9	2.82	....	....	....	2.04
19-19.9	2.85	....	....	....	2.09
20-20.9	2.89	$2.75	....	$2.62	2.14
21-21.9	2.93	2.77	....	2.64	2.19
22-22.9	2.97	2.79	....	2.66	2.24
23-23.9	3.01	2.81	$3.44	2.68	2.29
24-24.9	3.05	2.83	3.46	2.70	2.34
25-25.9	3.09	2.85	3.48	2.72	2.39
26-26.9	3.13	2.87	3.50	2.74	2.44
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, July 26, 1957.

Some crudes in North Central Texas and West Central Texas, are on the intermediate schedules.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.65
Middle District	4.47
Southwest Pennsylvania	4.18
West Virginia	4.00
Buckeye Grade	4.00
Zanesville Grade	3.04
Illinois Basin	3.15
Canada:	
Leduc-Woodbend	2.78
Redwater (Alta.)	2.67
Smiley (Sask.)	2.44
Pembina	2.65

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, flat, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 36.0°-36.9°, Fao	2.00
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.69
Iraq, 36.0°-36.9°, Tripoli, Banias	2.69
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

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★ P.G.-Japan, dirty (USMC—55%)	4.05

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Opportunities for graduate engineers in United States and abroad.

For instrument engineers, prefer 3 to 5 years experience in application of instruments on pipe lines, refining or petro-chemicals. For electrical engineers, prefer experience in design of oil and gas pipe lines. Salary in accordance with qualifications and experience. Replies strictly confidential.

PIPE LINE TECHNOLOGISTS, INC.

P. O. Box 6957 Houston 5, Texas

SENIOR DRILLING ENGINEER

Required by the National Iranian Oil Company to take charge of the drilling section of their Production Operations Division.

The applicant who should be a qualified engineer or technician, should have had long experience of the drilling of high pressure wells from 5,000 to 15,000 feet in depth and of high capacity well completion methods. He should also be familiar with oilfield developments from high capacity high pressure producing wells and with keeping records, drawing up drilling contracts, and office routine.

The drilling operations will normally be carried out by contractors or subsidiary companies and the applicant will be required to record these activities and assure the Director responsible for Production Operations that they are being carried out efficiently and economically. A good knowledge of modern drilling machinery and equipment is essential, and sound ideas on standarization and on drilling administration is required.

The successful applicant will be based in Tehran, which has a good climate, and a married man may bring out his family after three months from first arrival in Tehran. Contract for two years, extendable by mutual agreement. The position is one of responsibility, requiring a wide technical background, and provided the applicant is healthy and energetic an older man may be considered. Minimum experience 15 - 20 years.

In addition to a basic salary an adequate local allowance will be paid whilst the official is in Iran. Usual Oil Company leave and travel arrangements. Reply giving full details of past experience and salary to

National Iranian Oil Co.

Exploration and Production Department
Ave. Khabir (Ave. Villa Shemali)
Tehran, Iran.

HELP WANTED

PETROLEUM GEOLOGIST: An independent oil company with operations in the Rocky Mountain area and Canada has a position open in Olympia, Washington, for a man with a minimum of four years experience. Must be thoroughly familiar with surface mapping techniques. Salary open. Box K-307, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMO COMPUTER—Age 21 to 26, Geological Degree with physics and math through analytical Geometry. Average grades or better. Single, or with family small enough for easy mobility. Subject to periodic moves with field party. Advancement possibilities good. Send transcript and resume of experience to The Superior Oil Company, P. O. Box 1900, Midland, Texas, Attention Mr. Reel.

MUD LOGGING and Core Analysis Engineer, Medium-size company operating in the Gulf Coast has opening for aggressive man with executive ability to act as sales representative and assistant to management. Must have thorough knowledge of all types of equipment and techniques and sales experience is desirable. Salary plus incentive basis commensurate with ability to perform. Box K-315, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED
REFINERY ENGINEERS

OUTSTANDING OPPORTUNITY FOR GRADUATE, MAINTENANCE AND PROCESS ENGINEERS WITH 4 - 8 YEARS EXPERIENCE.

This well-known independent oil company offers you an outstanding opportunity to grow with their refinery technological division.

Write giving academic qualifications and employment history,

Mr. G. E. Smalley,

Hancock Oil Company,
P. O. Box 810,
Long Beach 1, California.

CHIEF PETROLEUM ENGINEER

Required by the National Iranian Oil Company, Tehran, Iran, for taking charge of their petroleum engineering department, shortly to be formed. The applicant will be required to build up the department and supervise the petroleum engineering problems of a large oilfield recently discovered, and of another smaller field, also to advise and help on problems which may arise on any new fields which may be found either directly by the company or others acting as operators for the company.

Must have an excellent knowledge of reservoir engineering in limestone fields, with estimation of reserves and production control. Must be able to supervise a petroleum engineering and simple chemical laboratory. The successful applicant will be required to assist and train Iranian assistants.

Applicant will be based in Tehran which has a good climate and can bring out his wife and family after a period of three months from first arrival in Tehran. Contract for two years, extendable by mutual agreement. The position is one of responsibility, requiring a wide technical background, and provided the applicant is healthy and energetic an older man may be considered. Minimum experience 15 - 20 years.

In addition to a basic salary an adequate local allowance will be paid whilst the official is in Iran. Usual Oil Company leave and travel arrangements. Reply giving full details of past experience and salary to

National Iranian Oil Co.

Exploration and Production Department,
Ave. Khabir (Ave. Villa Shemali)
Tehran, Iran.

HELP WANTED

MAJOR UNIVERSITY seeks applicants for teaching positions in petroleum engineering up to and including assistant professorship—salary for the school year depending on qualifications. Opportunity for graduate and research work. Reply giving full details, age, professional experience, academic record, references. Box K-293, The Oil and Gas Journal, Tulsa, Oklahoma.

OPENING FOR graduate Geophysicist or Physicist in Denver, Colorado. Duties involve development, modification, testing and evaluation of geophysical techniques for applicability to uranium. Salary from $6390 to $8645. Address inquiries to U. S. Atomic Energy Commission, Grand Junction Operations Office, Grand Junction, Colorado.

PETROLEUM ENGINEERS
GEOPHYSICISTS
(South America)

Immediate openings with major oil company for graduate engineers with experience in drilling, production, reservoir and equipment; also geophysicists experienced in interpretation and supervision. Working knowledge of Spanish desirable but not essential.

Liberal Employe Benefit Plans. Salary commensurate with experience.

Forward personal data and college transcript to: Box K-249, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION ENGINEER OR SUPERINTENDENT

Required by the National Iranian Oil Company

A qualified Engineer who has had a broad experience of high pressure large capacity wells from limestone fields. Experience of multistage separators and the handling of high wax content crude an advantage. Must have had experience of the construction of production installation. The successful applicant will be required to assist and train Iranian assistants. Applicant will be based in Tehran, which has a good climate, and a married man may bring out his family after three months from first arrival in Tehran. Contract for two years, extendable by mutual agreement. The position is one of responsibility, requiring a wide technical background, and provided the applicant is healthy and energetic an older man may be considered. Minimum experience 15 - 20 years.

In addition to a basic salary an adequate local allowance will be paid whilst the official is in Iran. Usual Oil Company leave and travel arrangements. Reply giving full details of past experience and salary to

National Iranian Oil Co.

Exploration and Production Department,
Ave. Khabir (Ave. Villa Shemali)
Tehran, Iran.

UNIVERSITY OF ALBERTA

invites applications for Associate Professor of Petroleum Engineering. Appointee to participate in senior undergraduate petroleum engineering teaching, to engage in research and to aid in development of graduate program. May carry on related consulting work. Salary and academic status dependent upon qualifications. Apply in writing (enclosing photo, and details of academic qualifications, research interests and publications and practical experience) to

HEAD, DEPARTMENT OF CHEMICAL AND PETROLEUM ENGINEERING,

UNIVERSITY OF ALBERTA,

EDMONTON, ALBERTA, CANADA.

HELP WANTED

PETROLEUM ENGINEERS with up to three years experience wanted by major oil company for reserve and valuation work. Permanent Tulsa location with opportunity for advancement. Replies should furnish complete personal data, education, experience and salary requirements. Box K-313, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL ENGINEERS

—to handle product development and sales engineering for prominent manufacturer. Drilling or production experience required. Opportunities open in all active drilling areas. Prefer young men who want to move into engineering sales. Past sales experience is not necessary. Replies held strictly confidential. Write:

Box K-317,

The Oil and Gas Journal,
Tulsa, Oklahoma.

COMPRESSOR STATION ENGINEER

Large gas utility in Great Lakes area needs graduate engineer, preferably under 40, with some compressor station experience. Assistant to Superintendent in design, field engineering and other problems related to maintenance and operation of stations. Liberal benefits. Salary in line with education and experience. State personal and educational qualifications.

Box K-318,

The Oil and Gas Journal,
Tulsa, Oklahoma.

REFINERY SUPERINTENDENT

Opportunity for Present Process Engineer

Independent refiner with modern plant and excellent growth prospects needs refinery superintendent. Will report to refinery manager and supervise all operations and maintenance. Definitely interested in mature chemical engineer with several years process engineering experience in modern refinery who has the necessary personality, judgment and energy to step directly into high level refinery supervision. Previous supervisory experience desirable but not essential for the right man. North Central states location with excellent living conditions. No placement fee.

For consideration, send resume to:
DR. LUTHER J. REID, JR.

GEORGE ARMISTEAD and COMPANY
1200—18th Street, N. W.—
Washington 6, D. C.

THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

MECHANICAL ENGINEER: Four years experience in electronics and natural gas transmission lines, desires sales engineering position with manufacturer or representative, preferably Gulf Coast Area. Box K-319, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT WORK, leasing for oil, for any one. Experienced in record checking. L. Sands, R.R. 5, Mt. Vernon, Ill.

SCOUT-LANDMAN, Age 35, degree, 7 years major experience Four-Corners, Gulf Coast, Permian Basin. Desire position aggressive small company or independent preferably Four Corners or Rocky Mountain area. Box K-320, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PET. ENGR. 31, seven years experience in drilling, production, workover, Louisiana and Texas. Desires position with aggressive independent. Excellent references furnished on request. Box K-321, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT - ADMINISTRATIVE. Degree, 31, married, 8 years contractor/producing company experience. Responsible; corporate records, financial statements, joint billings, administrative procedures, land records. Post Office Box 574, Dallas 21, Texas.

PETROLEUM GEOLOGIST: Six years extensive exploratory experience in Mid-Continent and Illinois Basin. Diversified background in development and evaluation. Desires to locate Gulf Coast with progressive independent. Resume on request. Box K-309, The Oil and Gas Journal, Tulsa, Oklahoma

GEOLOGIST: 8 years Oklahoma and Kansas subsurface experience with major. Masters degree. Desires change. Box K-299, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—10 years oil field experience, domestic and foreign. Very aggressive, capable and willing to relocate. Consider anything legitimate. References on request. P. O. Box 366, La Habra, California.

PRODUCTION FOR SALE

CAN DELIVER 1,000 to 5,000 bbls. crude oil daily, low grade or regular in tank cars or in pipe line at Wyoming points. Producer, P. O. Box 2362, Denver, Colorado.

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BUSINESS OPPORTUNITIES

FINANCIAL CONTACTS. Underwriters, Brokers, Private Finders of Capital reached. No shopping. Confidential. FREE ENTERPRISE ASSOCIATES, 817 51st St., Brooklyn, N. Y.

SOHIO PETROLEUM Company, Operator, solicits offers to buy its working interest in the Sallyards Water Flood, Butler County, Kansas. Total Gross production from Bartlesville Sand was 2,220 barrels in July, 1957. Average depth wells—2550 feet, 18 producing, 18 water input, water system and electric system. The other working interest owners have indicated they may be willing to sell their interest. For inspection and complete specifications contact: Sohio Petroleum Company, Box 9637, Oklahoma City, Oklahoma, Attention: J. E. Buckley, Phone VIctor 3-1544.

PARTNER TO FINANCE DEVELOPMENT of 600 acres proven Northeastern Oklahoma secondary recovery project. Partner receives tax benefits of development costs and depletion plus full return of investment prior to division of profits. Total investment million dollars; estimated return nine to twenty million.
Box K-301, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

OFFERING CHOICE ROYALTIES. You can now make very small investments on income Royalties or those ahead of drilling. A. S. Berry, 520 Wright Bldg., Tulsa, Okla.

WE WILL BUY your producing Royalties, Overrides, Oil and Gas Producing Properties. Ben H. Williams—Clarendon, Texas. Wiltex Oil Company.

LEASE AND DRILLING BLOCKS

EXPERIENCED Reliable Oklahoma oil operator has several leased blocks to drill. Good geology, near producing wells. Average depth: 3,000 feet. Would like to contact parties interested in buying up to ¾ interest in tests. Will sell fractions of 1/16th or more. These prospects have more than usual chance to obtain production. P. O. Box 1585, Tulsa, Oklahoma.

OIL AND GAS MINERAL LEASES available in Dell City area of Hudspeth County, Texas. U. S. Geological Survey Map shows anticlinal axis nearby favorable for oil-gas structure. Am fee landowner of over 2000 acres. Write quickly to: Jefferson G. Smith, 215 Littlefield Building, Austin 15, Texas.

OIL LEASES IN BOOMING

4-Corners Area. November Indian Lease sale brought 30 Million Dollars. Some leases sold for $3,200 per acre. Wells estimated up to 1500 barrels of oil per day. Oil Leases from $2.25 an acre. Fortunes being made. Write for free information now. **ATLAS OIL SURVEY, Dept. OJ-7, Colorado Bldg., Denver 2, Colo.**

WANTED

WANTED—productive shallow acreage to drill. Box K-316, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Oil Royalty, Gas Royalty, and working interests Texas, Oklahoma. A'Mell Oil Properties, 1201 Elm, Dallas, Texas. RIverside 1-9251.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

SERVICES

THE ALASKA SCOUTING SERVICE
Bi-weekly reports on All-Alaska Exploration. Address: John R. Roderick, Box 2278, Anchorage.

MANUFACTURER'S REPRESENTATIVE

MANUFACTURER'S REPRESENTATIVE wanted to sell line of plastic tapes for protective pipe wrapping and electrical insulation to the oil and gas industry. Exceptional products that will assure excellent profits. You will be backed by an aggressive national advertising campaign and generous technical assistance. Reply Box K-298, The Oil and Gas Journal, Tulsa, Oklahoma.

PLAT SHEETS

NEW KRAFTBILT PLAT SHEETS will solve your plotting problems. Choose from a broad selection of sizes, scales and paper types. Contrasting lines are sharp and clean. Bond, ledger and tracing papers are top quality. Our line is complete! Asy for Bulletin 57-W, Ross-Martin Co., P. O. Box 800-A, Tulsa, Okla.

LEGAL

SEALED BIDS will be received until 2:00 p.m. September 23, 1957, Pacific Standard Time, and opened at that time in the office of the Western Washington Indian Agency, Everett, Washington, for the leasing of 285.11 acres of allotted Indian Land, located in Townships 23 and 24 North, Ranges 12 and 13 West, County Grays Harbor and Jefferson, Washington, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of the Western Washington Indian Agency, at P. O. Box 915, Everett, Washington.

Successful Wildcats

OKLAHOMA

Ellis County: Shell Oil Co. 1 Lucile Peetoom, NE NE SW 29-24n-25w. IP 2,400 M.c.f. of gas per day, Morrow sand 7,961-76 ft., 8,032-42 ft. TD 9,223 ft.

Garfield County: Davidor & Davidor 1 Weber, NW 28-20n-4w. IPP 46 BOPD, 40 BWPD, Layton 4,711-25 ft. TD 6,430 ft.

Grant County: Davon and Apco 1 Johnson, NE SW 18-27n-8w. IPF 11,186 M.c.f. of gas per day, 40 BDPD, Cherokee sand 5,292-5,302 ft. TD 5,394 ft.

Gulf Oil Corp. 1 Rixse, NW 9-28n-7w. IP 1,047 M.c.f. of gas per day, Cherokee sand 4,758-71 ft. TD 5,745 ft.

Harper County: Eason and Wilcox and J. M. Huber, NE SW 8-26n-23w. IP 7,776 M.c.f. of gas per day, Chester 6,730-50 ft. TD 7,000 ft.

Kay County: John Medfelt and Lloyd Gray 1 Russell Smith, SE 18-25n-1e. IP 5 BOPD, 43°, 650 M.c.f. of gas per day, Skinner 3,994-4,003 ft. TD 4,286 ft.

Lincoln County: Ben C. W. Hyde, Jr., 1 Tedford, NE NE NW 31-13n-6e. IPP 75 BOPD, 19°, Second Wilcox 4,589-91 ft. TD 4,591 ft.

Logan County: T. P. Petroleum 1-B Waswo, NW 4-15n-4w. IPF 260 BOPD, Layton 5,389-96 ft.; Hogshooter 5,490-5,500 ft. TD 5,560 ft. New pay in East Cashion pool (Layton).

Fordee Rhoades Drilling Co. 1 Simpson, SW SW SE 13-15n-3w. IPP 20 BOPD, 8 BPW, 39°, first Wilcox 6,255-56 ft. TD 6,291 ft.

Muskogee County: Phillips Petroleum Co. 1 Hatcher "A," SW 36-11n-19e. IP 1,253 M.c.f. of gas per day, Spiro 2,970-87 ft. TD 4,493 ft.

Noble County: Barrett Petroleum Co. 1 State, SE SW SW 13-24n-2w. IPF 18 BOPD, 40°, Mississippi 4,382-94 ft. TD 4,434 ft. Opens Happy Star pool.

Osage County: Kewanee Oil Co. and Oliphant 1-A Clest Unit, NW NW NE 19-24n-4e. IPP 60 BOPD, 2 BWPD, 37°, upper Tonkawa 1,464-70 ft. TD 3,771 ft.

Sequoyah County: Stephens Production Co. 1 Redland Ranch Hale Unit, NW 27-10n-25e. IP 450 M.c.f. gas per day, Atoka 1,730-2,050 ft. TD 6,160 ft.

ALBERTA

Cities Service 16-36 Keystone, LSD 16, 36-48-4w5. TD 4,880 ft. Cardium oil well.

Shell Canadian Superior C7-24 Elkton, LSD 7, 24-32-4w5. TD 8,625 ft. Mississippian oil well.

Cities Service 6-27 Modeste, LSD 6, 27-48-5w5. TD 6,225 ft. indicated Cardium oil well.

Phillips-Husky 3A Savanna Creek, LSD 5, 32-14-4w5. TD 13,798 ft. Mississippian gas well.

BRITISH COLUMBIA

Phillips A-1 Kobes, Unsurveyed. Triassic gas well. TD 8,197 ft.

Phillips A-2 Townsend, unsurveyed. Mississippian and Triassic gas well. TD 7,448 ft.

Phillips 2 Highway, unsurveyed. Triassic gas well. TD 8,435 ft.

SASKATCHEWAN

Canso Natural Gas 11-28 Hoosier, LSD 11, 28-31-27w3. TD 2,430 ft. Viking oil well.

Sohio 16-31 South Roughbark, LSD 16, 31-5-13w2. Charles oil well. TD 4,868 ft.

Canpet-Okalta 8-33 South Ingoldsby, LSD 8, 33-3-31w1. Mission Canyon oil well. TD 3,604 ft.

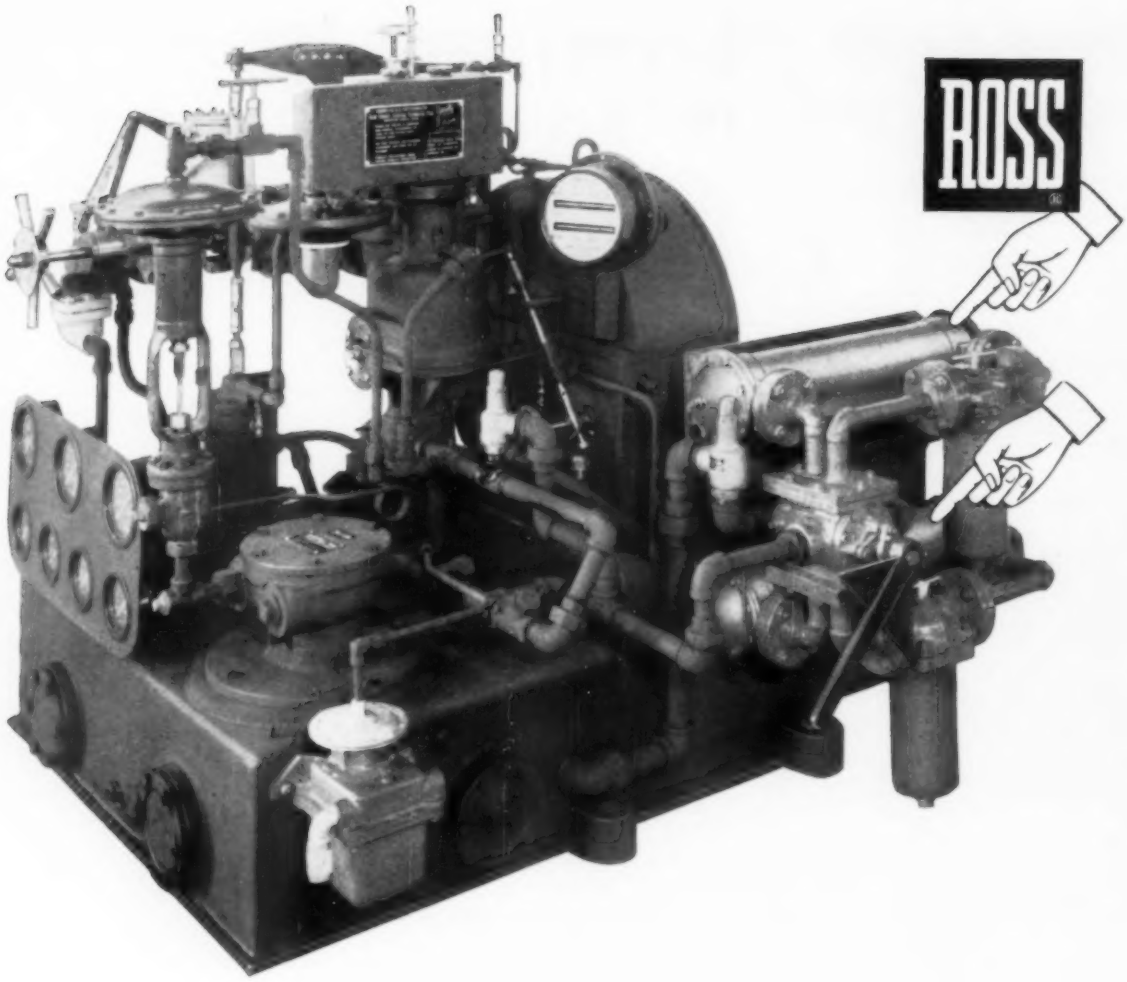
White Rose-Devon-Palmer-Canadian Superior 16-3 Adelaide, LSD 6, 3-10-1w2. Mission Canyon oil well. TD 3,700 ft.

ADVERTISERS IN THIS ISSUE

Allis-Chalmers Mfg. Co. 156, 157
Allis Co., The Louis 11
Aluminum Co. of America 43
American Blower Division of American Standard 35
American Chain Division of American Chain and Cable 144
American Iron & Machine Works Co. ..... Back Cover
American Recording Chart Co. 176
Baird Mfg. Co. 134
Baker Oil Tools, Inc. 64
Baroid Division, National Lead Co. 57, 58
Beech Aircraft Corporation 109
Bethlehem Steel Co. 135
Black, Sivalls & Bryson, Inc. 60
Braden Winch Company 169
British Petroleum Company Limited, The 160
Brown Oil Tools, Inc. 41
Business Reports, Inc. 121
Cabot Shops, Inc. ..... Inside Back Cover
Caterpillar Tractor Co. 126
CF&I Tubular Products, The Colorado Fuel and Iron Corporation 32
Chicago Bridge & Iron Company 77
Chicago Pneumatic Tool Company 54, 55
Clark Bros. Co., One of the Dresser Industries 27
Classified Advertising 187, 188, 189, 190
Coffing Hoist Division of Duff-Norton Company 125
Cook Company, C. Lee 151
Corrosion Services, Incorporated 170
Crose Manufacturing Co., Inc., M. J. 130
Dearborn Chemical Company 45
Delta Tank Manufacturing Company, The 29
DeZurik Corporation 145
Dowell Incorporated 141, 142
Dresser Manufacturing Division 133
Drilling & Service, Inc. 175
du Pont 34
Electro-Motive Division General Motors 16, 17
Engineered Oil Tools, Inc. 23
Engineering Controls, Inc. 59
Enjay Company, Inc. 155
Ensign Carbureter Company 19
Evinrude Motors Division of Outboard, Marine & Mfg. Co. 148
Fairbanks, Morse & Co. 4
Fleet-Line Co. 132
Flexitallic Gasket Company 158
Floridin Company 154
Fluid Packed Pump Company 146, 147
Franks Division Cabot Shops, Inc. ..... Inside Back Cover
General American Transportation Corporation 62
General Electric Company 38, 39
Goodrich Company, B. F. 1
Grancell, I. H. 136
Guiberson Corporation 47
Halliburton Oil Well Cementing Co. 8, 9
Harbison-Fischer Mfg. Co. 56
Hughes Tool Co. 91, 92
Inferno Co., The 155
International Nickel Company, Inc., The 66
Johnston Testers, A Subsidiary of Schlumberger Well Surveying Corporation 44
Jones & Laughlin Steel Corporation 31
Jones & Laughlin Supply Division 53
Kaiser Steel Corporation 28
Kinzbach Tool Co., Inc. 158
Lane-Wells Company ..... Inside Front Cover
Larkin Packer Company, Inc. 50
Librascope, Incorporated 166
Link-Belt Company 7
Lone Star Steel Company 89
Magnet Cove Barium Corp. 18
Marine Fabricating & Engineering Co. 122
Master Electric Company, The 26
Maxim Silencer Company, The 140
Midwest Piping Company, Inc. 14
Mission Mfg. Company 159
Mixing Equipment Co., Inc. 61
Moore Corporation, Lee C. 150
Mueller Co. 15
Nelson Electric Mfg. Co. 51
Oil Center Tool Co. 24, 25
Oil Well Supply Division 6
Olin Mathieson Chemical Corporation, Industrial Chemicals Division 30
Oliver Corporation, The 5
Parkersburg Rig & Reel Co. 20, 21
Penberthy Manufacturing Company 152
Penn Controls, Inc. 172
Petroleum Electric Power Assn. 10
Petroleum Equipment Suppliers Association 33
Race and Race, Incorporated 12
Rector Well Equipment Co., Inc. 42
Republic Supply Company 13
Rockwood Sprinkler Company 49
Ross Heat Exchanger Division of American-Standard 192
Ross-Martin Co. 132
Ryerson & Son, Inc., Joseph T. 153
Sargent Engineering Corporation 119
Southern Mill & Mfg. Co. 145
Smith, Barney & Co. 148
Southwest Industries, Inc. 48
Square D Company 36
Texas Company, The 46
Thomas Flexible Coupling Co. 171
Tulsa Winch Division of Vickers Inc. 174
Twin Disc Clutch Co. 37
United States Steel Corporation—Oil Well Supply Division 6
United Supply & Manufacturing Co. 115
Universal Oil Products Co. 40
Visco Products, Inc. 81
Vogt Machine Co., Henry 22
Well Equipment Mfg. Corp. 143
Whitmor Homebuilders, Inc. 173
Zink Company, John 52

LEGAL

By virtue of and in conformity with the provisions of Chapter 2, Title 30, of the Louisiana Revised Statutes of 1950, as amended, sealed bids will be received at the office of the Iberville Parish School Board in Plaquemine, Louisiana until and not later than 2:00 o'clock P. M. on Tuesday, September 10, 1957, at which time they will be publicly opened, for the lease of the sulphur, potash, oil, gas and/or liquid or gaseous hydrocarbon mineral rights in and to the following described lands, situated in the Parish of Iberville, Louisiana, to-wit: Fractional Section Sixteen (16), Township Ten (10) South, Range Eleven (11) East, Southwestern Land District of Louisiana, containing 513.36 acres, more or less. All bids to offer a cash bonus for a lease having a primary term which shall not exceed three years. Minimum royalty shall be one-sixth (1/6) of all oil produced and saved; one-sixth (1/6) of all gas produced and saved or utilized; two dollars ($2.00) per long ton on sulphur produced and saved; ten cents (10c) per ton for all potash produced and saved. One-sixth (1/6) of all other minerals produced and saved. Should lessee fail to begin the actual drilling (spudding in) of a well on the leased premises within one year from the date of the lease, the lease shall terminate as to both parties to the lease, unless on or before such anniversary date lessee shall pay a delay rental (which in no event shall be less than one-half of the bonus offered), which shall cover the privilege of deferring drilling operations for a period of one year. Upon like payments annually, drilling operations may be further deferred for successive periods of one year each during the primary term. The primary term of the lease shall be three years. The lease shall provide for the drilling of offset wells where necessary to protect the lessor's interest and shall contain the provision against the assignment or sublease of the lease unless the same is approved by Iberville Parish School Board. The lessee shall have the right to enter into pooling or unitization agreements with respect to development of the leased premises subject to the approval of the Iberville Parish School Board. Certified check payable to Iberville Parish School Board for the full amount of the cash bonus shall accompany and be deposited with each bid and no bid or deposit may be thereafter withdrawn or cancelled; and the cash bonus thus deposited shall be forfeited to Iberville Parish School Board by the successful bidder in the event said bidder does not enter into written contract within TWENTY (20) DAYS AFTER THE WRITTEN LEASE IS SUBMITTED TO HIM FOR EXECUTION. The Iberville Parish School Board reserves the right to reject any and all bids. Iberville Parish School Board. By: Walter Marionneaux, Jr., President. By: L. G. Hoffman, Secretary.



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To maintain continuous, trouble-free performance, two Ross Type BCF Exchangers have been installed as original components in its lubrication system. Excessive heat is dissipated, and correct lube oil viscosity maintained. The main journal, thrust bearings and governor receive their full share of properly cooled oil at all times.

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Division of AMERICAN-Standard

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~~Larger~~

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This improved and enlarged district "on the spot" sales and service center at Odessa is now offering 24 hour field service to Franks and Cabot customers. It has a stock of parts and factory trained personnel to keep your well servicing and work over units and pumping units operating at maximum efficiency and with minimum down time. The shop is large enough to repair, adjust, or overhaul four Franks units at one time. It is located at 42nd Street and West County Road.

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Cabot Shops, Inc.
Pampa, Texas

Franks Division
Cabot Shops, Inc.
Tulsa, Oklahoma

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WELL SERVICING AND DRILLING UNITS — FRANKS — DIVISION, CABOT SHOPS, INC. — TULSA, OKLAHOMA

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UNIVERSAL "55"
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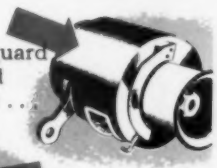
Safety stationary guard (encloses all mechanism) . . .



Rope divider is mounted to the safety guard . . .

AMERICAN IRON & MACHINE WORKS CO. INC.
MANUFACTURERS OF OIL FIELD EQUIPMENT
A
OKLAHOMA CITY

AMERICAN IRON & MACHINE WORKS COMPANY, INC.—Oklahoma City, Okla.—Subsidiary of AMERICAN MACHINE & FOUNDRY COMPANY